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EDITORIAL NOTES—GAS, &c.

The Manchester Institution Meeting.

THE members of the Manchester Institution were received at Salford on Saturday; and kindness was showered upon them by their hosts the Chairman (Alderman F. S. Phillips) and the members of the Corporation Gas Committee, as well as by the Engineer (Mr. W. W. Woodward). The visit was full of interest, so much so that the arrangements for the technical and business meeting were somewhat endangered, and, in fact, had perforce to be shortened. But the activity and promptitude of the President (Mr. J. H. Brearley) in the conduct of the meeting, enabled the members to deal with the *agenda* in a manner which gave satisfaction, at any rate to themselves. The general business was largely of a domestic character. It will be remarked that the "Question-Box" has been discarded as a failure, and as being detrimental to the yield of short discussable papers. The report on the preliminary arrangements for the Gas Exhibition in Manchester in the autumn of next year indicates that the matter is being taken up with considerable enthusiasm, and that a strong Advisory Committee, with Mr. Thomas Newbigging as President, has been formed. Several Corporations, District Councils, and Gas Companies have given their adherence to the scheme; and their influence will be exercised on its behalf. The co-operation of the Society of British Gas Industries has also been invoked; but no decision has yet been come to by the Council—possibly they want more information from the exhibitors' point of view before pledging support on the part of the Society. It will be seen from the sectional divisions of the exhibition, as designated in the report, that the display in St. James's Hall will be directed almost exclusively to the utilization of gas and the bye-products of its manufacture. The announcement of the results of the balloting for office-bearers for the coming year was received with marked approval. Mr. W. Prince will follow Mr. Brearley in the chair; and succession is admirably provided for by the appointment of Mr. T. Duxbury as Senior Vice-President and Mr. John Wilkinson as Junior Vice-President.

Turning to the technical proceedings, the first paper presented was by Mr. Glover, of St. Helens; but his "New "Apparatus for Preparing Lime for Gas Purification" seems already to be almost out of date, inasmuch as the death-blow is considered to have been given to the use of lime by the removal of the sulphur restrictions. Changes of method, however, are seldom made with rapidity; and it is probable that the use of lime will, in many places, be continued for some time longer, notwithstanding the advantages to be derived from its abandonment. Whatever, therefore, tends to lessen the cost of preparing lime, and especially if at the same time the work is rendered less disagreeable to the men, is well deserving of consideration; and Mr. Glover has evidently tested his apparatus thoroughly before making public his experience with regard to it. Special interest is aroused by the last paragraph in the paper, in which he refers to a similar apparatus of his devising, for the preparation of oxide of iron for purifying purposes. His promised communication on this subject will be awaited with some amount of impatience; the appetite having been whetted by anticipation of the good thing to come. We shall also look with curiosity for Mr. Meunier's revelation later on as to the process which, though not intended to remove sulphur compounds, has effected reduction in his working.

Mr. Stevenson's paper on his "Experiences in Compe- "tition for Power" is a very instructive record of the difficulties which have to be encountered by the gas manager of the present day in his endeavour to secure for his undertaking even a share of the gas consumption required for power purposes. In this respect, there has been a noteworthy change since the time, not so long ago, when almost every gas-engine fixed within the district of a gas undertaking was driven, almost as a matter of course, by town gas, until this source of consumption was looked upon as permanent. Then, the only practical alternative was the Dowson gas plant; now, the suction producer is proving to be a powerful rival. It is estimated that at the present time about 15 to 20 per cent. of the entire gas consumption of the United Kingdom is used for power purposes; but, whatever the amount, it is so considerable as to be well worth making every effort to retain it. The question which usually carries most weight with users of power is that of cost; but convenience is also an important consideration, to which, however, it is not always easy to attach a precise value. Moreover, from the user's point of view, it is often a serious drawback that, with variable loads, the suction producer is both troublesome and inefficient. It is not found that the sellers of this plant afford much information to their customers upon these points, which is perhaps natural. But they usually recommend the coupling up of a connection with the town supply of gas, to serve as a stand-by, in the event of a temporary stoppage of the plant. Occasionally, also, the latter is recommended as a second string to the bow, to serve in the rare event of a temporary failure of the town supply.

What, under such circumstances, should be the policy of gas undertakings? Under the Gas-Works Clauses Acts, no supply of gas can be refused subject to the conditions of the Acts; but it has appeared hard to be obliged to provide —possibly at considerable expense—a meter and service of sufficient capacity for a large gas-engine, only to find that the consumption is insignificant. Relief from this apparently onerous situation has been sought from Parliament without up to the present any success, though it has been obtained by electricity undertakings. On the principle that half a loaf is better than no bread, may it not be advisable to submit to a grievance of this kind, provided that no undue expenditure be incurred in furnishing the supply, and also that adequate rent be paid for the meter, &c.; or, what would be better still, an arrangement be made for a minimum charge. Following Sam Slick's plan with his clocks, a customer on such terms would be better than none, in addition to which there is always a possibility of the town supply taking the lead. This possibility should become a certainty, as soon as gas can be furnished at a sufficiently low rate.

At what price, then, can gas be supplied for power purposes without injustice to other classes of consumers? This must of necessity vary according to circumstances; but there is one consideration which has always to be borne in mind. This is a consumption which cannot be secured without special terms being made for it. Are such terms compatible with the general welfare of the undertaking? To supply at a loss would be injurious to the undertaking; and a loss is made, unless the price is sufficient to cover the cost of manufacture and distribution *plus* capital charges—not necessarily of the existing capital of the undertaking, but based on the amount required to provide for additional consumption, regard being had to the fact of this supply being almost entirely a day load. Worked out on this basis, it will probably be found that, generally speaking, gas can be supplied for power purposes at a sufficiently low price to secure this custom, and at the same time contribute to the standing charges of the undertaking. There is much to be said in favour of the contention that, in order to secure new business, new methods must be resorted to, in which view the restrictions imposed of late years by Parliament with regard to discounts are inimical to the gas industry, and should be opposed to the utmost. Great interest is contained in the figures advanced by Mr. R. Watson during the discussion on Mr. Stevenson's paper.

The well-known bias of Mr. Edward Allen, of Liverpool,

in favour of high-candle power makes it tolerably certain that, in his paper entitled "Some Notes on High *versus* Low "Grade Gas," but little has been omitted that can be fairly urged on his side of the question. For this reason, if for no other, the paper will be heartily welcomed outside the circle to which it was addressed. It is always desirable to hear all that can be said against the cause which one has espoused; and there must be many among the advocates of what, in common parlance, has come to be called "low-"grade" gas, who have been puzzled to know why Liverpool should be standing practically alone on this question. Now that the reasons have been made clear by Mr. Allen, we are in some doubt as to whether amusement or incredulity will be the predominant feeling. One thing, at all events, is very evident—namely, that Liverpool possesses what in politics would be regarded as "stern unbending "Toryism." For example, is not attention called in this paper to "the very beautiful flat-flame given by Liverpool "gas?" We offer no excuse for continuing the quotation, the picturesqueness of which is to be highly commended. "It is," pursues the paper, "not only the photometric "value of the light, but the colour and tone of the flame—"like a disc of burnished gold—that commands admiration. "In many of the shops and hotels, flat-flame burners are "preferred because of their cheerful glow; and although "it is known that for the same consumption of gas, six "times more light is given by an incandescent burner some "consumers refuse to make the change. They prefer the "rays of light that resemble the golden sunshine to that "which more nearly approaches the moonshine." *Chacun à son goût*. We are not disposed to envy the citizens of Liverpool their preference for a flat flame, even though this be "like a disc of burnished gold." Silvery rays of an incandescent burner are good enough for ordinary mortals.

It is almost incredible that Mr. Allen's figures have not made a convert of him, since, in our opinion, they more than prove the case for "low-grade" gas. It is true that, experimenting with 20-candle and 16-candle gas as ascertained by the Liverpool flat-flame test-burner, he finds a difference of 14·94 per cent. in favour of the higher quality of gas when both gases are tested in a "C" incandescent burner at the same rate of consumption. This means that the consumer would pay, candle for candle, nearly 6 per cent more for the 16 than for the 20 candle gas, assuming the price for the former to be 2d. less than that of the latter. Whether this is a suitable reduction to make for the lower quality, it is not necessary to inquire; although it may be remarked that, at the rate of ½d. per candle, the cost of Liverpool gas works out at about 11d. per 1000 cubic feet, the difference between which and the selling price of 2s. 6d. would leave 1s. 7d. per 1000 cubic feet, to cover all other working expenses, and dividend and interest charges. In the table, however, giving the average of tests made—July 28 to Aug. 4, 1905—the loss in calorific value consequent upon a reduction of illuminating power from 20 to 15·70 candles, is shown to be only 4·38 per cent., though in the same table the loss in illuminating power tested by the incandescent burner is shown to be 13·2 per cent. How is this want of correspondence between calorific value and illuminating power to be accounted for? Must it not be attributed to conditions unfavourable to the lower quality of gas, though unsuspected by Mr. Allen? For one thing, it is to be observed that the same rate of consumption—namely, 3 feet per hour—was observed for both qualities of gas, although it is the general experience that different qualities of gas require different modes of treatment. Anyhow, we are not disposed to believe that there is not a closer agreement between calorific value and illuminating power as developed by an incandescent mantle, than is shown by Mr. Allen in his experiments, which cannot be accepted as conclusive, especially as they are in conflict with results obtained by other and equally reliable experimenters.

Mr. Allen admits the superiority in calorific value of the lower qualities of gas; and indeed his experiments show this to be very marked, especially as regards his (nominally) 12-candle gas. Here again, although the loss per cent. in calorific value is only 5·08 per cent., he makes out a loss in illuminating power tested by the incandescent burner of 23·21 per cent. Similarly, lower qualities of gas show still greater discrepancies—namely, 8·95 and 12·18, compared with 30·80 and 39·86 per cent. respectively. Nothing could show more clearly than such increasing discrepancy the unsuitability of his mode of testing low qualities of gas.

With a singular perversity, Mr. Allen would have us believe that the movement in favour of "low grade" gas commenced before the introduction of the incandescent mantle, and that the latter saved the situation which was thus created! That the incandescent mantle did to a very great extent save the situation as against the electric light, may be freely acknowledged; but Mr. Allen ought to know, if he does not, that one main argument in favour of a reduction of illuminating power which was advanced by the first advocates of the change, was the non-necessity of illuminating power as such, in consequence of the introduction of the incandescent mantle. It is to be regretted that, judging from the paper, neither historical nor experimental accuracy can be counted as among Mr. Allen's strong points. The discussion on the paper was postponed; but perhaps this criticism will add a little interest to the reception the paper will receive when the members come to handle it.

Prospects of the Coming Session.

THE little indication that has been afforded of late has not allowed hopes to be entertained that the next session of Parliament would exhibit much life in connection with gas legislation; and the peep that we are enabled to give, through the notices advertised in the "Gazettes" up to the time of going to press, points to the session being more spiritless than even its immediate predecessors. Until next week's issue, however, we shall not be able to complete the notices; so that the publication in our "Parliamentary Intelligence" to-day must not be regarded as fully foreshadowing promotions. The scanty list of gas lodgments, too, must not be taken to be due to any one cause, though it can well be imagined—after the experience of suspensory clauses in the last session, and with municipalization rampant at Westminster—that gas companies are a little reticent over applying for any further powers as long as they can dispense with them. Of course, it is out of the question to expect that the large section of the House of Commons governed by a set policy of municipalization will see that their inflexibility is in opposition to the interests of communities, by the deterring effect it has upon private enterprise seeking to apply to their business and operations modern legislation in connection with gas supply. In addition to this retarding influence, it must not be overlooked that the three London Gas Companies, several of the Suburban ones, and many of the chief of Provincial ones, have supplemented their powers during quite recent years; and, furthermore, there is the effect of the incandescent gas-burner in many places, the decrease of consumption produced by which has gone some way towards taking up the increased consumption secured by cooking-stoves, gas-fires, and the slot-meter system. With some gas companies it will be the requirement of money for the distribution department where the pinch will be first felt by delay in applying to Parliament.

In connection with the present notices, the first point that will be observed is that the number of Companies engaging in the second Joint Bill for the removal of the sulphur restrictions has risen from four (since the announcement was made at the meeting of the Gas Companies' Protection Association) to seven. The Maidstone Company, in their Special Bill, are also asking for relief in the same direction. If there are no other applications in the concluding notices, there will only remain about a dozen Companies in the kingdom trammelled by these useless clauses; and in future, if they want relief, they will have to ask for it unaided, and at a distance from the batch of precedent which has, through its proximity, an intrinsic value to those now asking for the abrogation of the clauses. With regard to Gas Company Bills for ordinary powers, those for which notices have been given up to the time of going to press can almost be counted on the fingers of one's hands; and there are no Bills yet announced from municipal authorities for gas powers alone, or in which gas appears to any extent. Only a couple of local authority measures incidentally mention gas. The most comprehensive Gas Bills so far are those of the Falmouth, Maidstone, Mitcham and Wimbledon, Worthing, and Basingstoke Companies. The Grays and Tilbury and Shanklin Companies are seeking re-incorporation and powers that purpose an extension of the undertakings. Three Gas Companies so far—from Brockenhurst, Annfield Plain, and Llandrindod Wells—are asking for incorporation. The variation of illuminating power standards and revision of testing clauses have place in certain

of the Bills. There is not, up to the last "Gazette" received, any notice of a Bill from the Hull Corporation in connection with the suspensory clause inserted in the Act of the newly-named East Hull Gas Company, formerly the Sutton, Southcoates, and Drypool Gas Company. The Merthyr Tydfil people, as already announced, are not going to take advantage of the suspensory clause in the local Gas Company's Act of the present session. Therefore, to the extent that we are permitted to judge at the moment, the prospects are that the coming session is going to "beat the "record" of late years for its fewness of gas promotions. In Water Bills there is to be a good appearance.

The Settlement of Contract Disputes.

It is a matter of common knowledge that there has of late been in places a little disturbance of the serenity that has long existed in the gas industry, between the parties to engineering contracts. Into the merits of the specific causes that have ruffled the calm, it is not our intention or business to go. But we are reminded of what has been bruited abroad on the subject by certain passages that appear in Sir Alexander Kennedy's recent presidential address to the Institution of Civil Engineers. Disagreement resulting in vexatious litigation frequently arises on contracts; but we are pleased to say not in connection with the gas industry. But though there is only occasionally the outward evidence of discontent and difference, under the surface there is not always the harmony that is desirable. This is largely due to the ambiguity and overloading of specifications, to consequent diversity of interpretation, and to the common stipulation that the engineer shall determine disputes, and that his decision shall be final. It has been said many times before, but there is no harm in repeating it, that this is a one-sided arrangement, and, being one-sided, is inequitable. Sir Alexander, with his vast experience in so many of the highways of engineering, holds very strongly that it is inadvisable to make the engineer the arbitrator in relation to his own specification; and he is far from any solitary existence in entertaining this particular view. Of course, there are many matters of detail in relation to the carrying out of a contract that the engineer must settle; but it does not matter how open or complete specifications may be, difficulties do crop up upon which the decision of a third party is very desirable.

In the gas industry, however, the application of arbitration to contracts appear to have been but little considered, although arbitration clauses in contracts in other branches of engineering are credited with having a highly conciliatory effect, and often produce composure without their application, when difficulty does arise between engineers and contractors. Arbitration is certainly better than law of a more expensive form. In the electrical industry, the Institution of Electrical Engineers a few years ago formulated a set of model general conditions of contract, one of which refers disputes or differences "to the arbitration of a person to be mutu- "ally agreed upon, or, failing agreement, to some person "appointed by the President for the time being of the "Institution of Electrical Engineers." Provision is also made for work under the contract to continue during the arbitration proceedings, and for the award being final and binding on the parties. These model general conditions for contracts have, it is stated, received an almost universal adoption by the electrical engineering profession. Reverting to the opening sentences of this reference to this particular part of Sir Alexander's address, there are a couple of passages in the address which appear to be particularly pertinent. "Strictness, or even what is called severity, in a "specification is not in itself against the interest of the "contractor. As long as he can see what is wanted, it is "his business to prepare for it." This is true; but with the increase of strictness or severity, the more need is there—in order to preserve amicable relations, and, above all things, to ensure justice—for provision being made in contracts for reference to arbitration, in place of the investiture in one of the parties to a dispute of the sole right of judicial interpretation. The very existence of dispute must in cases obfuscate judgment.

The framing of a set of model general conditions for contracts does not, of course, bind to adoption; and we cannot see any reason why what the Institution of Electrical Engineers has done the Institution of Gas Engineers should not do. The matter was advanced by Mr. Samuel Cutler, jun., at the dinner of the Society of British Gas Industries on Friday night, by his reference to a suggestion that the Society should approach the Institution of Gas Engineers on the matter. His experience warrants the belief that gas engineers would welcome a standard set of general clauses for insertion in contracts; and, after what transpired on the occasion of these remarks, the Council of the Institution would undoubtedly give sympathetic consideration to any representation on this head from the Society.

Society of British Gas Industries—
Cheap Gas for Heating Purposes.

The meeting and first annual dinner of the Society of British Gas Industries on Friday—under the presidency of Mr. Dugald Clerk—was a genuine success; and from that day there must be laid to rest the view of the timorous few that the Society was some unholy thing, with aims hostile to the Institution of Gas Engineers. How often during the past two years we have set our pen to disclaiming that the Society was anything of the kind. Minds capable of broad survey remarked the honest ring and openness about the movement from inception to institution; and so it comes to pass that the relations—as bodies with similar ends though through different courses, as bodies with kinship in one mother industry—between the professional organizations and the Society were firmly established on Friday. The President of the Institution of Gas Engineers (Mr. Charles Hunt), the Hon. Secretary (Mr. James W. Helps), and several members were present; and the District Gas Associations of England, Ireland, and Wales, were represented officially or by members—all holding out the hand of good fellowship, all assuring of co-operation in work that has common concern, and all wishing the young organization the greatest success. The recognition of the Society by the older established organizations of the industry was complete; and the Society now ranks, as it has sought to be ranked from the first, as the "friend and ally" of the Institution and of the District Associations. There need be no explanation at this time of day as to the objects of the Society. Mr. Dugald Clerk pronounces them legitimate and co-operative; and the President of the Institution sees great utility in such a Society, and invites conference on matters of common importance. If the great prosperity of the gas industry has been due—as Mr. Hunt acknowledges it has been—in no small degree to the energy and ability that has been displayed in carrying on the allied industries, and if at no time has alliance in all sections of the industry been more necessary, through competition, than at the present time, then there is the fullest justification for the existence of an organization of the allied industries to and through which representation can be made and movement from time to time be effected.

The necessity for cheap gas was the central topic of the paper that Mr. Walter W. Thomas, a Past-President of the Society of Architects, read at the afternoon's meeting, and of two speeches which followed it; and, as the discussion of papers is not the rule at the meetings of the Society, the topic was also imported, and rather extensively, into the after-dinner speeches. Mr. Thomas takes an intelligent interest in all the various methods of utilizing gas, though we trace fragments of evidence here and there in the paper of the writer being a bit behind the times so far as improvements in gas lighting and heating appliances are concerned. But cheap gas veins the paper. The author's ambitions are all good, though, if his intimacy with gas engineers and their doings was as great as his intimacy with his own professional work, he would have known that they have long been operating along the road (but with freedom restricted by Parliament and by municipal traders in electricity) to which he is now directing them. Mr. Thomas asks for cheaper gas; but we rather think what he was really aiming at is a special and attractive price for heating purposes. As an architect, he looks at the matter as one interested in the preservation of the buildings of towns and cities from the pernicious effect of smoke-laden atmospheres; as an architect, too, he has the sanitary interests of communities at heart. There is much in what he says; and much worth trying to attain. But the result from the gas suppliers' standpoint would not be all that is predicted. Mr. Thomas does not fully appreciate that there is a point in every case, under present conditions, from which every successive general reduction gets more

difficult to make. Steps in economy at the manufacturing end of the business become more and more difficult to find; and at the consumers' end, though a larger business is done—lessening to some extent the expenses at the manufacturing end, and reducing slightly the interest on the capital expended—the profits per 1000 cubic feet, as reduction after reduction has been made, have had a tendency to become more slender, while the amount required to make a penny or twopenny reduction over the whole consumption has grown greater. But, notwithstanding, no progressive engineer is losing an opportunity of gathering in all that tends to produce gain, and which in turn enables him to lower prices to meet competition. While we say this, there is much reason in Mr. Marsh's protest against the great diversion from municipal gas undertakings of profits that should be devoted to the cheapening of the price of the product.

It is a wonderful vision that Mr. Thomas conjures up, of a one-third reduction of the gas industry's capital being produced "by catering for a constant, regular load." A constant and regular load is not possible in the gas industry with such intermittent uses as cooking and lighting; and while all the business possible in heating is heartily welcomed and sought for, it would not—running through only the hours and days when temperature is low—do anything much towards levelling the rugged lines of output disclosed by the daily charts. Where the price of gas is now at a reasonable figure for ordinary purposes (having regard to the situation and character of a district), extraordinary industrial day consumption is what has to be sought for in order to fill the valleys of the present varying load; and the gas that is required for this purpose, Mr. Dugald Clerk tells us, is a gas that can be supplied at between 1s. and 1s. 6d. per 1000 cubic feet, and of about 600 B.Th.U. It is at the stages where difficulty is found in making further concessions in the price of gas that the sections of the new Society representing the methods of utilizing gas come in. It is the improvements that they effect, and which produce economy, that give the consumer the equivalent of many pence reductions in price. If the money value of the economy that the incandescent burner has effected for gas consumers could be counted, it would be found to be immense; and the increased efficiency of gas-stoves would represent a substantial money saving, wherever the improved ones are adopted. It is well to urge to further improvement; but there must also be the encouragement of appreciation of what has latterly been done by our gas-stove makers.

The assistance of architects in the application of gas lighting and heating to buildings—residential and otherwise—will, of course, at all times, be most heartily welcome. But Mr. Thomas cannot be allowed, without a little protest, to lay the blame at the door of the gas industry for the supreme passing over of the claims of gas by architects. For years the gas industry has complained of an insufficient attention by architects to the necessities of interior gas illumination and heating; but it has been like crying in the wilderness, for the complaint has had practically no effect upon architects. Though the gas industry offered cheap lighting and heating to the clients of the latter, and pointed the way to economy of space and brickwork in buildings, architects clung to the dirt-producing and air-polluting chimneys of their forefathers in order to favour electricity for lighting. It can hardly be expected that in any closer association between the architect and the gas lighting and heating engineer, the latter can produce rules that will compass the multitudinous variety of interior decoration and appointments, or the great diversity of householders' tastes for illumination. The best thing for architects to do is to make a practice, in connection with their new designs, of seeking the advice of the officials of the local gas undertakings; and they will not fail them.

The Restriction of Discounts.

After-dinner speeches do not as a rule call for much attention in the columns of the Technical Press; but at the dinner of the Society of Gas Industries, there were several suggestive speeches which it would be a neglect of duty not to put upon record. Among the points of the speech by Mr. James W. Helps was a question to which we have also frequently directed notice in reviewing the Gas Acts—that is, the hurtful effect of the discounts clauses so often inserted in Gas Companies' Acts. Municipalities with electric stations have been largely instrumental in getting the clauses imposed; and they have proved in many instances a drag on gas suppliers in their subsequent competition. The interests of the community and of local industry are in this way sacrificed on the altar of municipal trading. Mr. Helps strongly protests against this; and his protest is justified. Last session there was a trace of more leniency on the part of Parliament; and Mirfield, Kidderminster, and Truro were all allowed freedom to make their own terms for power consumption. But it is those Companies who are already fighting for industrial custom, as at Croydon, with their hands tied behind them, over whom we are at present concerned. What of them? Will the promotion of a Joint Bill have to be resorted to for the removal of the discounts clauses, and so secure justice for those Companies?

Some Good Advice.

When it became known that, on the occasion of the visit of the London and Southern District Junior Gas Association to the Gaslight and Coke Company's show-rooms in Kensington High Street, Mr. F. W. Goodenough had consented to address the members, the event was looked forward to by them with more than ordinary interest; and it is perfectly safe to say that there was no feeling of disappointment when they heard what he had to say. Mr. Goodenough is a keen fighter, with a strong faith in his cause; and these are qualities eminently fitted to kindle in others a feeling of confidence and the spirit of emulation. His remarks were (it will be seen from the report which appears in another part of this issue) directed more particularly to the work of the outside staffs of gas undertakings; but there were many words of advice and encouragement which cannot fail to be of assistance to juniors in other departments as well. If it is possible to place one point before another in importance, we would direct particular attention to what Mr. Goodenough had to say as to the wisdom of not exaggerating the case for gas. The advantages of gas are numerous enough and substantial enough to be put forward without any call being made upon the imagination. In fact, Mr. Goodenough's advice is to aim rather at understating the claims; for, as he truly says, "it is infinitely more satisfactory for a consumer to tell you, six months after he has installed gas in place of electricity, that he has saved considerably more than you led him to believe he would, and has got even a better light than you led him to anticipate, than for him to say that, though he has saved a good deal, he has not saved as much as you told him he would." Another very useful piece of advice was that his hearers should substitute in their minds the word "customer" for "consumer," and act as they would do if it were possible for the customer to go elsewhere and buy his gas. As to increasing the use, and the usefulness, of gas-cookers, the address informs us that the scheme recently put into operation by the Gaslight and Coke Company, of giving instruction to consumers at their own homes by means of lady demonstrators, is proving an unqualified success. Possibly this simple means of increasing the popularity of so important a branch of the business of a gas undertaking will in time be more generally adopted. We certainly agree with the opinions which were expressed after Mr. Goodenough had sat down, and would urge all whom it may concern to read, mark, learn, and inwardly digest the address.

Rating Statistics.

By the courtesy of Mr. James Carter, the Borough Treasurer of Preston, we were, in the last issue of the "JOURNAL," able to give some particulars, as in previous years, from his statistics regarding the rates, &c., levied in different towns. These figures are, of course, quoted as statements of fact, not solely for purposes of comparison with each other. In no case can the old saying that "circumstances alter cases" be truer than it is when used in connection with local rates and the charges made for gas, water, and electricity. It is, however, interesting to see which places have low rates and cheap light, heat, power, and water, and which are less favourably situated; and this Mr. Carter shows over a range of nearly a hundred large and medium-sized towns—together with the extent by which the rates are benefited by profits from what are known as "reproductive undertakings." Among the points which strike us on glancing through the statistics is the fact that though one has been added to the number of towns in which the rates are 9s. or more in the

pound, in five of the total number of these unfortunate places the amount levied is less than was the case in the previous year, while two towns which were above the 9s. on the last occasion are below it this year. Of the towns included in the statistics, West Ham continues to hold pride of place with the handsome total of no less than 10s. 4d. in the pound; but her sister in misfortune—East Ham—though again second, has had a nice substantial drop from 10s. 4d. to 9s. 7d. in the pound. The number of cases in which the rates amount to 8s. or more in the pound is 29 on the present occasion—or practically one-third of the total number of towns included in Mr. Carter's list—as compared with 26 last year, and 23 the year before that. Oxford, Lancaster, and Bournemouth add to their other attractions that of levying rates amounting to not over 5s. in the pound; and this pleasant state of affairs, be it noted, is not brought about by any specially large receipts from profitable undertakings in aid of the rates—in fact, Bournemouth only benefits to the extent of ¼d. in the pound from this source. In both Lancaster and Oxford the assistance is substantial; but it is by no means so great as in many instances in which the rates levied are nevertheless a good deal heavier. In Carlisle, out of the rents of property and profits transferred from municipal undertakings, the rates are reduced to the extent of 1s. 10d. in the pound, in Warrington 1s. 7¼d., and in Macclesfield 1s. 5½d.; while the rates still amount to 7s., 7s. 4d., and 7s. 3d. respectively. But, of course, as we have already remarked, the circumstances and needs of places vary so widely that it would be useless to expect that profitable municipal undertakings would necessarily mean low rates, but merely "lower" rates. The figures relating to gas are even more favourable than was the case last year; there being thirteen places included at which the charge is 2s. or less per 1000 cubic feet, as compared with eleven in 1905-6. Widnes is again first in this respect, with 1s. 3d. per 1000 cubic feet for domestic supplies, and still more favourable terms to large consumers and users of power.

Gas-Stoves and the Smoke Problem.

The report by the Coal Smoke Abatement Society, on the thermal efficiency and hygienic value of gas-fires (portions of which were reproduced in the "JOURNAL" last week), and the favourable conclusions arrived at, have drawn a considerable amount of attention once more to the advantages of gas over coal as a fuel from the point of view of purity of the atmosphere. This is an aspect of the matter which appeals to Manchester; and the publication of a leading article by the local "Guardian" was followed by quite a number of letters from correspondents. The writer of the article points out that, in the report by the Coal Smoke Abatement Society, gas on the score of healthiness comes off remarkably well; while on that of economy it has important advantages, though in continuous use it is more costly than a coal-fire. There is thus great inducement to adopt this means of cooking and heating even apart from atmospheric considerations. But it is from the point of view of the purity of the outside air that the "Guardian" mainly advocates the extended use of gas-stoves; the basis of argument being the not unreasonable one that the smoke from dwellings is mainly responsible for the present polluted condition of the atmosphere. The correctness of this assumption has been promptly challenged by more than one correspondent; the opinion being advanced that factories are by far the greatest sinners. There is, however, it must be remembered—and as some of our electric lighting friends, among others, have learned to their cost—a means of controlling the smoky factory chimney which cannot be applied to the thousands upon thousands of outlets from domestic fireplaces. Therefore it is the domestic chimneys that stand in need of attention; and to cure the nuisance which they give rise to—be it very great or only small—the gas-stove is at hand. Our contemporary urges that two lines of progress are open—to increase the efficiency of the gas-stove, or to reduce the price of gas for heating purposes. It is argued that it should be quite worth a corporation's while to supply gas at cost price, or near it, and to hire out stoves of approved designs at a nominal rental; and the distribution of a heating, as apart from a lighting, gas is also hinted at. This latter suggestion is certainly "looking ahead;" but as regards the charge made for gas as at present manufactured, the citizens of Manchester may possibly ask themselves whether the amount that is annually drawn from the profits of the undertaking in aid of the rates could not be more advantageously used.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 636.)

MOVEMENTS on the Stock Exchange last week were very unstable and vacillating. Almost from day to day, the tendency would vary sharply; swaying first one way and then the other. The opening was good; the monetary prospect being more cheerful. But this was followed by a relapse, as further gold shipments produced nervousness. A slight recovery supervened to relieve some markets; but it left others untouched—some moving up, and some down. But at length further arrivals of gold had a definite effect, and an almost general improvement was the result, which endured up to the close. In the Money Market, there was some hardening in the earlier part of the week; but later on the situation grew distinctly easier, and afforded fair promise that the requirements of the current week may be met without involving much difficulty. Business in the Gas Market recovered. On some days it became quite animated; and a few of the less frequently dealt in issues came more into notice. The tendency, too, was quite favourable; and movements, though slight, pointed in the upward direction. In Gaslight and Coke issues, the ordinary was at first very moderately dealt in, but afterwards broke out into activity—the demand sending the quotation up half-a-point. The lowest price at which stock changed hands was 98½; but most transactions were at better figures, and on Saturday 99¼ was the ruling price. A small amount of business was marked in the secured issues; but their prices did not vary. The maximum was done at 89; the preference at from 108 to 108⅞; and the debenture at from 85½ to 86½, the latter figure being well above the nominal quotations. South Metropolitan started off very briskly, and advanced its quotation a point; but afterwards it fell very quiet. Transactions ranged from 128 to 129¼. The debenture stock was done at 85 and 86. There were a few dealings in Commercials; the 4 per cent. marking 110 to 110½; and the 3½ per cent. being done once at 108½. The debenture was not dealt in. The Suburban and Provincial group went at about their usual pace, with small business; but at the Mart—again last week, as in the week before—a considerable quantity of Suburban gas stock was readily absorbed. Marked transactions showed that Alliance and Dublin was done at 20⅜; Brentford old at 263; Brighton ordinary at 165¾; British at 41¼ and 41½; and West Ham ordinary several times at figures ranging from 104 to 104⅝. In the Continental Companies, Imperial was more active, but was rather inclined to be easier. The best price was realized on the opening day, 183½; and the concluding bargain on Saturday was the worst, 181¼. Union was done at 129 (an advance of 1 in the quotation); and a small amount of the preference was taken free at 141. European fully-paid was firm and active at an advance of half-a-point, changing hands at from 24¼ to 24¾. Among the undertakings of the remoter world, Bombay was done at 7; Cape Town at 14; Melbourne 4½ per cent. at 100¾; Buenos Ayres at 11⅞; Primitiva at from 7⅛ to 7⅜; ditto preference at 5 1/16; ditto debenture at 97½; River Plate at 12½ and 12⅝; ditto debenture at 98¼ and 99; Monte Video at 11¾; and San Paulo at 13½ and 13¾.

The closing prices are shown in our Stock and Share List on page 636.

ELECTRIC LIGHTING MEMORANDA.

Standardization—Meter Registrations and Radiator Consumptions—The Defects of the Nernst Lamp—Gas-Engine Breakdowns—The Unreliability of Electric Supply.

THE presidential address of Dr. Glazebrook to the Institution of Electrical Engineers has been looked forward to with the expectancy of great things. When Dr. Glazebrook was elected President, there were among a few some misgivings as to whether a physicist of the high standing of the Director of the National Physical Laboratory would, in his address, level himself to the requirements of the members of the Institution. The address was delivered last Thursday week; and it was one of the plainest and unvarnished of tales that the members could conceive. So much so was it that it was disappointing. It has been received in the most sober of spirits by the Electrical press; and nowhere has there been enthusiasm over it. There was, in fact, nothing in it to create any warmth of feeling. It contained a review of certain of the proceedings of the Institution last year; but the greater part of the address was taken up with the question of standardization. Dr. Glazebrook peeped into the past, and quoted somewhat extensively; and then he came down to the present, and told the members what was being done in connection with the International Electrotechnical Commission for the standardization of nomenclature and ratings of electrical apparatus. It is anticipated that the Commission will accomplish much valuable work; but it is hoped that flexibility in improvement will not be endangered by the application of too much standardization. There is also to be further inquiry into insulating materials; and it seems about time. It is also announced that very shortly the report will be issued regarding what has been done in connection with the vexed question of carbon filament incandescent electric lamps. There is a paragraph in the address that it may be hoped those who are engaged on the

photometrical work of the National Physical Laboratory will ponder well, though the words were not intended to be used in the particular connection to which we apply them. "It must be remembered that we require to know the value of our standards to a much higher order of accuracy than that to which they are used in order to be certain of our results. Much of the rapid progress of the electrical industry is due to the fact that the quantities dealt with are capable of very exact measurement; and I trust that we shall never underrate the importance of great exactness in all fundamental measurements." The propositions regarding secondary photometrical standards and so forth for the use of manufacturers as proposed from Bushey, have sometimes inclined us to think that, for the sake of revenue, there are those of the National Physical Laboratory who are in danger of "underrating the importance of great exactness in all fundamental measurements."

In the paragraph taken from Dr. Glazebrook's address, it is said that "the quantities dealt with [in the electrical industry] are capable of very exact measurement." It will be a fine thing when this can be said regarding the quantities of electric current supplied to consumers. Much has transpired which shows that one must not place the strictest confidence in the "exact measurement" of electricity meters. There was a case the other day in the City of London Court, in which the City of London Electric Lighting Company sought to recover from a Mr. Melling £2 19s. 9d. for electrical energy supplied. It was admitted by plaintiffs that the meter with which the Company had furnished defendant registered current when electricity was not being used. It seems that defendant is one of those unfortunates who has been trying to warm himself by the aid of electric radiators; and the whole trouble between him and the Company, before it was found out that the meter had been registering current without just cause or reason, arose over the latter sending him an account for four times more current than usual for the period of the year, although defendant had only been using half of the radiators formerly employed. Naturally he was incensed. Then when the meter was tested, the Company made their present claim; and defendant still refused to pay. His Honour Judge Lumley Smith, appeared to understand the ravenous appetites of electrical radiators; for he remarked: "They take a lot of electricity." He was sorry for defendant; but he was bound by the meter according to the contract to supply. So the defendant had to pay, although his meter was of such a lively disposition that it would not stop. Defendant, astonished at the decision, inquired, "Supposing I am charged for 1000 units more than I have consumed, must I pay?" "Yes," suavely said his Honour, "if the meter says so." Unhappy electricity consumer!

When it is remembered what a vast amount of trouble the engineers of central supply electricity stations have to encounter, it will be agreed that they must be men of strong nerves. If they be municipal electrical engineers, they never know what is going to happen; no matter whether they are company or municipal engineers, they never know when the next breakdown is going to occur; and just when they think they have realized a lamp that is going to knock incandescent gas lighting "into fits," something goes wrong. With them it is always the unexpected that is happening. They thought they had something exceptionally good in the Nernst lamp. It has had a fairly large adoption; and a fairly large relegation to the scrap heap. A note was given a fortnight ago recounting the troubles that Mr. Walton had experienced at Gloucester with Nernst lamps; and correspondence on the subject has since been merrily proceeding in the "Electrical Review." Mr. James Brown, the Electrical Engineer at Kilmalcolm, has had much the same experience as Mr. Walton with Nernst lamps; and he has given them a considerable trial for street, shop, and house lighting. Owing to trouble, however, he has had to abandon their use. Difficulties other than those mentioned by Mr. Brown have been his lot; and he also complains of the waste of the lamplighter's time over the lamps. The writer of another letter from Gloucester is Mr. Parsons, who says he has taken out most of the Nernst burners he has installed; and many of them have been replaced with glow-lamps, which have proved as cheap to use—taking upkeep with consumption—and far more reliable than the Nernst lamp. Mr. Hanson, of Stirling, has also suffered from the vagaries of the lamp. He speaks of "fairly good results" with all but one size of the lamps; and "fairly good results" a line or two later drops to "moderately satisfactory results." He confesses to foolishness two years ago in advising a customer to instal multiple 1 ampere Nernst lamps; and the average life was under fifty hours. The Electrical Company, Limited, point out that, to get at the root of the trouble, it should be borne in mind that Nernst lamps are, in their mechanical construction, so far similar to arc lamps that they need overhauling from time to time. Consumers, in our opinion, want something that they can overhaul themselves, without having to go to the expense of having an expert on the job. The same Company advise that Nernst lamps should not be used on circuits below 200 volts; but Mr. Brown's voltage at Kilmalcolm is 240, and he asserts that it is absolutely steady. We will not question his statement; but will merely remark that the consumers in his area of supply are extremely lucky. The fact remains that Mr. Brown is one of the complainers mentioned above. Confirmation of the want of success of Nernst lamps also comes from Mr. Yeaman, of Hanley, and Mr. Curel, of Witney; while Mr. Smith, of Leigh, seems to be rather more satisfied than his colleagues in different parts of the country, to whom allusion is made above. The life vagaries of the lamps appear to be well established. The makers of the lamps claim much in their advertisements; but, from Mr. Yeaman's letter, it would seem that they do not care to back up their opinions by contracts. This is the lamp the Electrical Company advertise as being the best means of fighting the competition of incandescent gas-burners. Is it really the "best means"?

Gas-engines, like Tennyson's brook, are by some users expected to go on for ever. That they require a little overhauling at times, the users will not admit; till the hard-worked piece of mechanism eventually refuses, without attention, to go on any longer. Then comes the opportunity of the electrical engineer, and later on of the gas engineer again. The celebrated story of how an electrical motor got into a Harrow printing establishment finds its "double" in a tale from Slough. The opening of the story, as told by the Electrical Engineer concerned, reminds us of the orthodox style in which police constables start their evidence in a police-court: "At 2.45 on Friday last in the afternoon"—that was, to be precise, on Friday, Nov. 9—it appears that the Engineer of the Slough and Datchet Electric Company (Mr. A. E. Farrow) was sitting in his office waiting for something to turn up. Perhaps we had better tell the tale in our own way. At the hour named, there was, it would appear from the details, a loud and impatient knock at the office door. "What's that?" we imagine the startled Engineer cried, "A message from the 'Slough Observer.' The printer is in the slough of despond. His gas-engine has broken down. Cannot get it repaired under three days; and the paper must be published in an hour." [The paper must have a small circulation.] "Ah, ah!" exclaims the excited Engineer, "now I have you in the hollow of my hand." And he looked at his hand expecting, in his agitation, to see the Slough Gas Company writhing there. "Out with the motor car, man it, off to the stores, and get a motor." Away flew the car, heedless of legal speed limits, with the Engineer and his staff; and within one hour and a quarter, the motor, so the sensational story runs, had settled down to the quiet execution of its duty. Mr. Farrow lost little time in himself—modest man!—mailing an account of his heroic feat to the press. It was a 1-horse power motor. And the whole world wondered—not at the feat, but at something else.

There is, however, another side to such tales. There was a case mentioned in the "Memoranda" a fortnight since, in which a manufacturing firm claimed damages of the Loughborough Corporation for failure to supply electrical energy to them for about six hours. Their works were stopped, and about 200 workmen were thrown idle, and sent home. It was reported within the past fortnight by the "Midland Daily Telegraph," that great inconvenience had been caused to power users in Coventry, in consequence of a breakdown of one of the boilers at the Corporation electricity works. "It has necessitated," says our contemporary, "for the time being a large diminution in the consumption of electrical energy for power purposes, and a revision of working hours in the factories affected, among which are many prominent cycle and automobile manufacturers." The electric light failed in a York church the other day, though two circuits had been provided for safety. A fortnight ago the electric light failed during a concert at the Portman Rooms. During the counting of the votes, in connection with the recent Borough Council Election, at the Town Hall, Battersea, the electric light went out three times. In a southern suburb one night last week, electric light consumers in one district were getting out candles and lamps to tide them through the hour-and-a-half that they were deprived of electrical energy without the slightest warning. These are instances of electricity supply failure that have come under notice during the past week or two. In employing electricity for power purposes, the user runs the double risk of breakdown of motor and failure of supply. With gas-engines, there is only the liability to breakdown of the engine; and that liability is minimized by occasional attention. Failures of gas supply, owing to the capacity for storage, is so rare that to hear of one creates surprise. No one is surprised to hear of a failure of electricity. We do not want to frighten the printer of the "Slough Observer;" but to be forewarned is to be forearmed. It may be of interest to him and others to learn that one in every eight electrical motors insured with the British Engine, Boiler, and Electrical Insurance Company, Limited, broke down in 1905. We know of one user of electricity for motive power purposes who, through past troubles, now keeps a spare motor by him.

The delinquencies multiply of municipal authorities trading in electricity; and we cannot avoid their notice. The Southern Association of Gas Engineers and Managers were in the summer at the Walthamstow Borough Council's electricity station, and were cordially welcomed by Mr. Spurr, the then newly appointed Electrical Engineer. He is therefore in no way responsible for the conditions which have given the Local Government Board room for practically an all-round condemnation of the electricity station and its past management. Mr. Hooper held the inquiry into an application for a further loan; and, in the report of the Board, it is stated that much of the plant appears to be of inferior quality and faulty design, and owing apparently to neglect or incompetence on the part of the late Engineer, has been allowed to get into a very bad state. Of the loan applied for, the Board will not allow £535, part of £1075 for some 135 house services (averaging £8 each), as they regard the price as extravagant; Mr. Spurr believing the work could have been properly done for £4 each service. The Council asked for £1110 for motors for hire; but the Board inform them they have no power to provide motors in this way. The amount is consequently disallowed. A

sum of £45 is also refused; it being required for a small amount of street lighting by Tantalum lamps—the grounds of refusal being the relative cost of lighting by gas and electricity, and the present financial position of the undertaking. The Board are of opinion that it is inadvisable to incur any capital expenditure that can be properly deferred. The "Electrical Review" passes some strong comments on this position of affairs at Walthamstow. "Here," says our contemporary, "is an example of the limitations of municipal enterprise. Things have got to such a pass that capital expenditure must be restricted to the utmost, with the natural result that the full development of electricity has to be hindered. . . . There are many other towns where sooner or later the Local Government Board will have to say that 'it is inadvisable to incur any capital expenditure that can be properly deferred.'"

ELECTRICAL MISSTATEMENTS.

THE "Electrician" is responsible for the following paragraph:—

The Engineer and Manager of the Ramsgate and District Electric Supply Company (Mr. M. Farrer) recently issued some interesting figures as to the relative cost of electric and gas lighting in Ramsgate. The figures given are the result of actual experience; and for the purposes of comparison, two firms in the same line of business were taken—*Electricity:* Messrs. Hawkins and Co. System: "Excello" flame arc. Total candle power, 6400. Cost per hour, 6d. *Gas:* Messrs. Lewis and Hyland. System: Keith high-pressure. Total candle power, 5600. Cost per hour, 7d. In arriving at the above figures, the candle power of the small gas-burners at Messrs. Lewis and Hyland's has been taken at 200-candle power each, as no figures were given. The candle power of the arc lamps is the mean hemispherical candle power. In actual practice the facts are far more favourable to electricity than the figures show, for (as Mr. Farrar justly observes) the arc lamp must invariably give the same candle power throughout its life; whereas it is a matter of common knowledge that the incandescent mantle rapidly falls off, after a few hours' use, to somewhere about 50 per cent. of its original candle power.

We have made inquiries into these statements, and find the paragraph is characteristic of the manner in which electricians deal with gas-lighting matters. To start with, the installation of high-pressure lighting referred to is of 6000-candle power. This is taking the nominal figures. But, as a matter of fact, the eight exterior lamps, instead of being of 600-candle power each as calculated, are actually of 700-candle power; so that, if we gave the complete installation the benefit of the actual power, the total illumination would be 6800 candles, and the cost would be just a fraction over 6d. per hour—not 7d. as stated. Of course, these are both very small items; but they considerably alter the final result. The illuminating power of the so-called 200-candle high-pressure burners is 300 candles. The remark as to the great reduction in light after the mantle has been in use for a few hours is, of course, devoid of sense. As a matter of fact, especially with high-pressure plants, if the burners are kept in reasonably clean condition, the light should at no time decrease more than 15 per cent. from its highest efficiency; and compensation for this is well covered by the difference between the nominal and actual candle powers mentioned above. It is possible to clean the interior of the Keith high-pressure burner without risk of damage to the mantle; and there is no excuse when such work is not done. The main cause of depreciation of incandescent gas-light is uncleanliness, and not deterioration of the constituents forming the mantle. It is time the journalists of the electrical press were aware of this elementary fact. The particular installation alluded to in the paragraph is kept in good condition by the Ramsgate Gas Department; and since the installation was completed about two months ago, orders have been received by the James Keith and Blackman Company, Limited, for three more plants from the Department, which, we think, somewhat answers Mr. Farrar's remarks as to which system is the most suitable. In our opinion, for outside shop lighting, excepting perhaps for jewellers, who want to dazzle the eyes of the public, the "Excello" flame arc lamps are not suitable. It would be interesting to know if the 6d. for the cost per hour of the electric lamps includes maintenance, as we are given to understand by users of these lamps that the maintenance is a serious item. One user in the neighbourhood of London gave the information the other day that he was charged 1s. 6d. per lamp per week for carbons and maintenance; and the men of the Electricity Department were worrying him every two days. We assume the "Excello" arc lamps mentioned in the paragraph are only for lighting the exterior of the premises, whereas the Keith plant is for both interior and exterior lighting. With contrary illustration all around in London, we cannot understand, our contemporary endorsing and emphasizing such a remark as "the arc lamp must invariably give the same candle power throughout its life." The final statement in the paragraph is as grossly false as it can be. The repetition of such assertions can only bring ridicule upon those making them, from men whose knowledge of these matters has enabled them to come to a different conclusion.

We have received from Mr. A. Wilson Fox, of the Labour Department of the Board of Trade, a copy of a report which has just been issued dealing with the standard time rates of wages in the United Kingdom at Oct. 1 last. This has been prepared in continuation of a similar report drawn up in 1900.

GAS AND ELECTRICITY VIS-A-VIS AT THE WEST HAM TOWN HALL.

GAS and electricity are often brought to close quarters. In the nature of things, being perpetual rivals, they cannot help it. But their rivalry is generally of—what shall we say?—a nomadic order; it has no definite abode. It wanders here and there throughout the district of the supply of the two commodities; and each rival is constantly on the look-out to gain advantage over the other. An assault is made upon a position from opposite points; and the one or the other of the rivals is left to retire discomfited. But gas and electricity have, during the past week, been brought face to face in a very pronounced manner in the West Ham district. The scene was the Town Hall; the occasion a Trades Exhibition. The so-styled "Trades Exhibition" appeared, however, to be something got up for the behoof of the Corporation Electricity Department, with the Gas Company turning up and claiming place as one of the respectable trades or businesses in the district—much we should fancy to the disgust of the chiefs of the Electricity Department. Anyway the officials of the Electricity Department will acknowledge that the Gas Company did yeoman service in putting life into, and some handsome exhibits in, the display. The special stand of the Electricity Department and that of the Gas Company faced each other, and were separated only by some 10 feet; and electric flame arcs and high-pressure gas-lamps were hung at about equal height, with defiance marked in every feature. The high-pressure gas-lamps wore an aspect of supreme indifference. But the flame arc lamps looked as though they were at times very much aggravated—their general demeanour was fussy, and then they would splutter, with intervals of more gentle flickering as though they were trying to suppress their excitement.

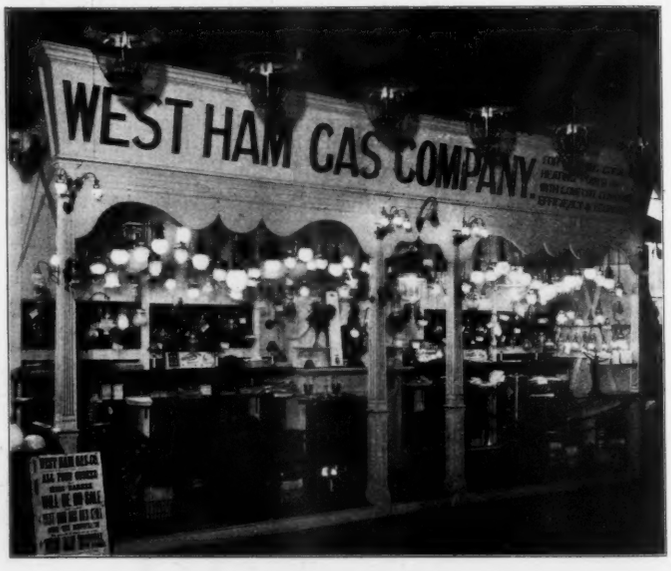
As is hinted above, the Electricity Department had the biggest advantage in the show. From the roof were suspended a dozen flame arcs, and round the stand of the department were hung four more. But the electrical officials evidently had not properly gauged the strength of their rival; for after the first experiences with the flame arcs round the stand, they substituted new ones. But when the flame arcs were all going at night time, those in the roof were—observed from the floor-level—sorry examples of lights that are credited with any illuminating power from 500 to (according to the tensile strength of electricians' consciences) a few thousand candles. One or two thousand candles more or less appears in electricity to make little difference when talking of the illuminating powers of flame arc lamps. When those in the roof came to be examined, and then compared with the low-pitched eye-irritating and fluctuating ones round the stand, the tyro, with a modicum of explanation, would understand the relationship existing between artificial lights and the law of inverse squares, and how nominal candle power does not always mean useful or effective candle power. It was generally agreed by disinterested observers (and the hall was thronged with them at night time) that the penetrating power of the roof flame arcs was not what might have been expected. But although there were sixteen of these flame arcs—"Excello," "Eclipse," and possibly some other types too—going in the building (four in close proximity to the high-pressure gas-lamps) their colour did not, in the slightest degree, suffuse the light of the high-pressure gas-lamps, nor, when these were turned out, of that proceeding from the ordinary vertical and inverted gas-lamps hung within the Gas Company's stand. It was indeed very interesting to observe that there was not the effect in this respect that might pardonably have been anticipated, in view of the number of flame arcs in the building. The steadiness of the high-pressure lighting and the flickering of the flame arcs—the two brought to such close quarters—could not have failed to attract the attention of the ordinary visitor whose standard of judgment is the practical visual one, combined with relative costs. The high-pressure gas-lamps along the front of the stand of the Gas Company were Sugg's, and seven in number, each fitted with three burners; the pressure being raised by a little hot-air engine, which was capable of doing twice the amount of work. The flame arcs were stated to cost 1½d. each per hour; but we do not know what the department included in that 1½d.—whether or not it is the estimate of the total out-of-pocket expenses of the consumer—nor was the consumer told whether, if he favoured flame arcs, it would be advisable for him to multiply the 1½d. by four if he wanted to get the full benefit of the current expended, nor was the consumer informed whether the 1½d. per hour per lamp applied equally to the short-hour and the long-hour consumer. Of a truth, there is much the electricity consumer does not learn about electric lighting until he receives his winter quarters' accounts, and then ascertains the total of the incidental expenses. It was also remarked that several notices announced the philanthropic intent of the department to supply all comers with electricity for power at 1d. per unit (with, we believe, discounts for large consumption), and for heating and cooking at 2d. per unit; while lighting consumers—the backbone of the electricity undertaking—were welcome to electricity at 3d. per unit.

Transferring attention from the notices as to prices to the stand, to see what the Electricity Department were doing in the way of creating admiration for the appliances which are supposed to give effective utilization to the energy supplied, a tiny motor was noticed, that did not, we must admit, in appearance do justice

to this special branch of the business. There were also knife and boot machines, as well as ventilating-fans bearing streamers like a recruiting sergeant out in the wind. And at another stand occupied by a Laundry Company, the Electricity Department were giving practical demonstration of the driving of machine "irons," which by the way were gas-heated. The motor in this case and the electricity were being supplied free, at the expense of the ratepayers perhaps, for the good of the municipal cause. Returning to the official stand, there were two or three radiators, expensive in first cost and expensive in running judged by their heating value, with the German-sausage shaped glasses, trying with sickly and cold effort to persuade Englishmen that their hereditary *penchant* for a warm-looking and richly-glowing fire, throwing out a good heat, was all a mistake, and that heat produced by electricity at 2d. per unit would—after life-long prejudice and fancy had been broken down, and the user of the radiator had become accustomed to less heat and to paying more than formerly for such as he did get—be ever so much better for him. Looking along the stand for other means of utilizing electricity at 2d. per unit, there was a miscellaneous array of little saucepans, kettles, coffee and shaving pots, curling-irons, and flat-irons. The *petite* boiling arrangements looked more novel than useful; their own capacity questioning serviceability for family requirements. At a confectioner's stand in another part of the exhibition, was an electric oven, in which, during the morning of the visit, a 4-lb. joint of beef (certainly not of a size to offer great resistance to heat) had been cooked; the operation having taken an hour and a-half, or one-third more time than slow cooking would have taken in a gas-oven. On another occasion, a pair of fowls were cooked in the oven, and occupied an hour-and-a-half. This was a quarter of an hour longer than the caterer estimated they would take in a gas-oven. There were three coils at the base of the oven; and these were well coated with grease, which someone in the Electrical Department will have the pleasure of cleaning off, so that smell will not offend when the oven is brought into action again. The keeping clean of these coils would, if such a construction of oven were adopted, add somewhat to the labour in the kitchen. No information could be obtained as to the electricity consumed in the process of cooking the 4-lb. joint of meat or the fowls, as the oven was not metered. [Parenthetically, it should be explained that the oven and the electricity were in this case also supplied free by the Electricity Department for the sake of the advertisement.] But the heating-up of the three coils and maintaining the heat would undoubtedly cause an expenditure for electricity that would not be agreeable to the householder when brought into comparison with the gas-oven. Certain it is, that electricity has something to do in this line before rising to the economical level of its gas rival. Another incident in this connection may be noticed. One day of the exhibition, the Vulcan Electric Company, in conjunction with the Electricity Department, advertised the fact that they would cook during the evening a number of chops and steaks. At the appointed hour, something went wrong with the electricity arrangements; and the Gas Company's representatives, taking advantage of the opportunity, fitted up a cooker beside the electrical hot-plate, and cooked the chops and steaks for their rivals, amid much good-natured banter and applause. Then, as to hand flat-irons, the Electricity Department were also lending the irons and supplying the current for demonstration purposes at the stand of the before-mentioned Laundry Company. A few months ago, something was said in one of the electrical technical papers as to the danger of electrical heated flat-irons; but we did not see mention of this at the exhibition. As to the incandescent electric lighting on view—well, the less said the more kindly disposed we hope the Electricity Department will consider us.

Turning to the Gas Company's brilliant and attractive stand, the structure itself was of beautifully white-painted wood, with supporting columns, fluted and gilded—the whole having been made by the Gas Company's workmen. It was a creditable production. In large gilded letters at the top were the words "West Ham Gas Company, for Lighting, Cooking, Heating, Power, &c., with Comfort, Convenience, and Economy." There was an assortment of gas-fires on view; and when it is mentioned that the contractors to the Company in this department have titles incorporating (put alphabetically) the distinguishing appellations of Davis, Fletcher, Arden Hill, Main, Planet, Richmond, Sugg, and Wright, the classes of fires exhibited will be recognized. A Clark syphon stove—the "Favorite" bar syphon to particularize it—was shown; and Messrs. S. Clark and Co. had, in another part of the exhibition, a stand to themselves, on which was a very effective display of their many specialities. Centrally arranged on the stand—forming a beautifully artistic combination with the overmantel—was one of Edgar's "Blenheim" fires, giving a fine incandescent body of fuel, and throwing out a splendid heat. Cooking-stoves—large and small were also on view—and on the platform a Richmond cooker was employed by Miss S. Barker in demonstration work. The results of her skill were disposed of after each demonstration; and the West Ham Hospital profited by the proceeds. On the Gas Company's stand, there was also a Maughan's geyser, with a perfect model of a bath attached. This geyser has a lighting jet outside; and it is one of those safety arrangements where the gas to the burner is only turned on simultaneously with the water, and the water is turned off as the gas is similarly extinguished. Of the incandescent gas lighting exhibits, all that need be said is that high-power lighting for interior and exterior purposes, and domestic and shop lighting, were demonstrated in representative forms of vertical and inverted burners—the latter in ordinary and bijou sizes. If the electricians of West Ham had hitherto ever prided themselves that they monopolized artistic merit in lighting fittings, they had their minds cleared of the mistake here. Graceful ornamental fittings in all styles were on view. One central statuesque figure supported three bijou incandescent burners, and looked handsome. It was also seen that ordinary fitting adaptors for inverted burners have departed from the plain to artistic styles, which render them equal in excellence of appearance to fittings specially designed for the purpose. The use of the pneumatic switch was also demonstrated. The glassware exhibited for house use was also very pretty. Gas-heated flat-irons, one of Richmond's "Tubal" greenhouse heaters, and useful gas-heated appliances for industrial purposes were likewise on view. It was altogether a good display for such a small space as the Gas Company occupied.

The interest in the exhibition far and away centred in the rivalry between gas and electricity; and we rather like the idea of the two being brought into close quarters in this way, so that comparison can be readily made. As previously said, the exhibition attracted so many visitors at night time that it was occasionally almost uncomfortable. Music lent a further attraction to the exhibition. The Band of the 4th Volunteer Battalion Essex Regiment supplied the greater part of the programme during the week; but, on Tuesday and Wednesday evening, the Gas-Works Band occupied the platform, and rendered some excellent music.



The Gas Company's Stand.

We may heartily congratulate the Gas Company on the part they took in this Trades Exhibition; for a gas undertaking's relationship with trade is an intimate one, and upon it the prosperity of such an undertaking has a no mean dependence. It will take many West Ham "Electrical Bulletins" to clear off the impression that the Gas Company made at this exhibition.

Paris Gas Supply.—Notwithstanding the fact that we are within a few weeks of the close of the year, at which time the provisional arrangement now in existence between the Paris Municipality and the Liquidators of the Gas Company for ensuring the supply to the city will expire, no decision has been come to in regard to the future control of the service. The Council have before them a report by M. Desplas; and at the meeting of that body on Monday last week he dealt with the conclusions arrived at by the Committee to whom the matter was referred. He examined successively the systems of direct and interested control, and came to the conclusion that the latter would be preferable. The subject was under discussion again on Friday, when M. Poirier de Narçay expressed himself strongly in favour of direct control, and M. Sauton, who has had twenty-five years' experience with gas affairs in Paris, was equally strong in his support of the other system. MM. Massard and Lajarrige dealt with the question mainly from the employees' standpoint; and their remarks were loudly applauded by the occupants of the seats set apart for the use of the general public. M. Lajarrige was, we believe, formerly in the service of the Gas Company. The debate was adjourned till yesterday, when the Prefect of the Seine was to address the Council.

THE KENSINGTON SHOW-ROOMS OF THE GASLIGHT AND COKE COMPANY.

It would indeed be an absent-minded pedestrian who could pass by without noticing the handsome building in Kensington High Street, at the corner of Young Street, several floors of which are utilized as show-rooms by the Gaslight and Coke Company. In the daytime the varied assortment of up-to-date gas appliances which is exhibited in the extensive window space of the ground floor claims attention in a manner that is not to be denied; while when darkness sets in, the double row of outside lamps suspended from the walls is equally effective in commanding notice.

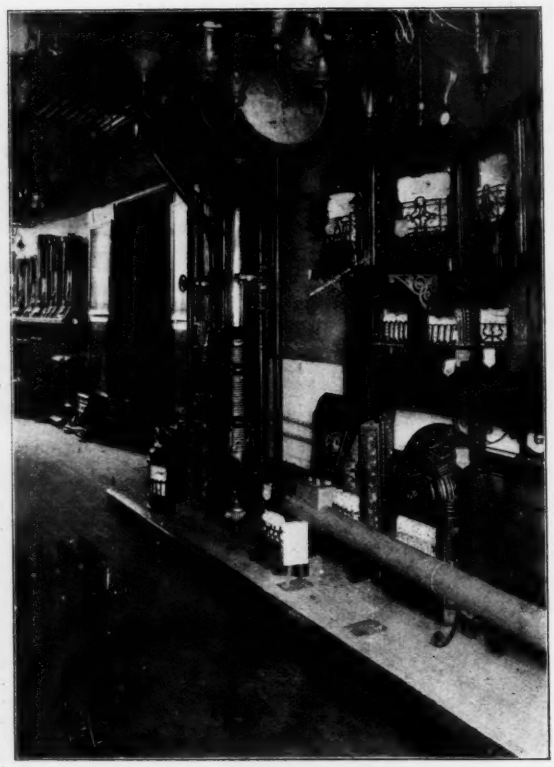
The building, which was erected by the Company about twelve years ago, has 100 feet frontage in High Street, and 150 feet in Young Street; and in spite of the large amount of space which this represents, there is not a square inch wasted anywhere. In the two windows facing High Street, there is an attractive display of fittings for lighting, gas-fires, &c.; while the first window in Young Street is fitted up as a complete kitchen, in a manner that can hardly fail to appeal to the fair sex. The advantages of the appliances here displayed are accentuated by numerous framed and pithily worded arguments. What housewife, for instance, in these days could fail to be touched by the statement that "With a gas-cooker one servant will do the work of two?" In the next window there is a collection of first-class heating stoves; and after that, two gas-engines which are used in connection with the lighting and ventilation of the premises. One of these is a Crossley engine, with a direct-coupled Lancashire dynamo running into accumulators. The electricity thus generated is utilized to drive the fans for ventilating the premises; and the accumulators, of course, permit of the working of the fans at such times as the engine is not running. The second engine is a smaller one—1 H.P.—by Messrs. W. Sugg and Co., for use with their high-pressure lamps. This brings us to the double row of outside lamps. The top row, which is level with the second floor of the building, consists of eight 1500-candle power Sugg high-pressure lamps. Each lamp contains three 15-feet burners; and the pressure at which they are worked is 16 inches. They are fitted with flexible tubes, to enable them to be lowered for cleaning purposes. The lower row is made up of six of Edgar's induced-draught lamps. Each of these is fitted with six 10-feet burners, which give a light of about 1200 candles.

Main Show-Room, on the First Floor.

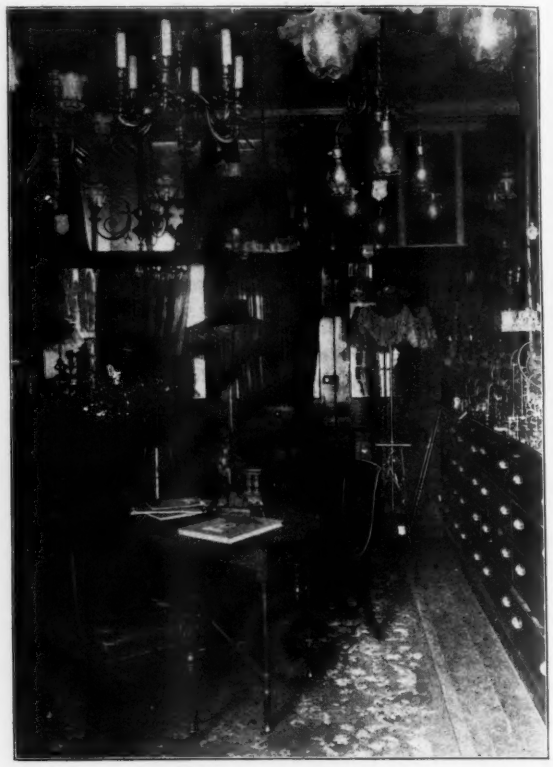
In the basement of the building there are extensive store-rooms, from which about 300 service layers, fitters, &c., are served every day; the quantity of piping of all sizes sent out in the course of a year amounting to about 250,000 feet. Parts of every stove on hire are stocked, as well as automatic goods, brackets, pendants, and gas-fittings of all sorts; and there are also a large number of meters of all sizes kept on hand. Desks are arranged at which the men can enter up their books each day; and a separate department is provided for maintenance fitters. Two Dey time recorders, by means of which 42 men per minute are enabled to punch their own time, are found to work very successfully; and there is evidence of consideration for the employees in

Ground Floor Show-Room and Staircase, Looking from the Front Door.

Show-Room for Geysers and Other Hot-Water Appliances.



Another Section of the Hot-Water Fittings Room, showing the Ruud Apparatus.



The Fittings Show-Room.

the provision of storage space for cycles. On the wall in the basement a "Suggestion Box" is invitingly fixed about in the line of vision of the men; and from this it is gratifying to learn the officials sometimes derive useful ideas. In the centre of the ground floor there is a broad staircase, as will be seen from the illustration; but the building is also fitted with a comfortable hydraulic lift. In front of the staircase, it will be noticed, there is a counter for the transaction of business; while behind it there is a varied selection of large cookers. One of these which attracts particular attention is provided with a jacketed hot plate by means of which the waste heat from the stove is made to furnish a supply of hot water which passes to a tank fitted above. It is the invention of Mr. Amendt, and is useful for hotel or institution work, where the stove is in constant use, and hot water is always needed.

The main show-room is on the first floor; and here is to be seen a very extensive stock of fittings, fires, and cookers of all sorts and sizes. The cookers are ranged along one side of the room; and to show the uses to which the top burners can be put, dainty china and enamel vessels are placed upon many of them. The majority of the fires are stacked in the middle of the floor, where they make an imposing array. There are, however, also some fitted into grates, with overmantels, &c., complete, which can be shown in action. Kensington is, of course, a neighbourhood that requires special catering for; and a large proportion of the demand is for the more expensive classes of goods. Many persons, too, possess in their houses handsome dog grates, which they are unwilling to discard, with the result that gas-fires which can be fitted into them are largely in request.

Passing through a doorway on the right-hand side of the illustration, there is a special department for geysers and hot-water circulators. It is a rule of the Company that all geysers ordered through them shall be fitted up by the makers. This ensures the work being properly carried out, and so does away with all risk of trouble through faulty fitting by plumbers or other men who may not thoroughly understand such appliances. Objects of special interest in this department are a large Ruud water heater and a Richmond "Tubal" conservatory heater. The usefulness of the latter, it may be remarked, is not confined to structures for containing plants, for the Gaslight and Coke Company are supplying a large number of them for warming motor houses. As to the Ruud apparatus, this is used to supply the whole of the building with hot water—a pretty extensive requirement, considering that between 200 and 300 men wash there every evening, to say nothing of the demands for office and kitchen purposes. The apparatus fitted up will raise the temperature of 90 gallons of water from 56° or 60° to 160° in forty minutes; and the gas consumption when it is at work is less than 200 feet an hour. As soon, however, as the temperature reaches 160°, a thermostat comes into action and shuts off the gas; and until the water falls to 120° no gas is used, with the exception of that taken by the small bye-pass. Moving on, we come to a handsomely decorated room which is set apart for the display of the best class of fittings, and in which one could very comfortably spend half a day or so in the selection of goods. It will be seen that the ceiling (which, it may be remarked, is made of stamped steel) and walls are covered with pendants and brackets; and all these are connected with the gas supply, so that intending purchasers may enjoy the advantage of seeing in action any which they may fancy before definitely deciding whether or not to have them. Even should it be broad daylight when the customer arrives, that makes no difference; for curtains are fitted wherever light can penetrate, so that at a minute's notice the place can be turned into a dark-room, thus permitting the lights to be seen under proper working conditions. The light in the centre of the room is so arranged that it can be turned on from one point and off from another. All along each side-wall there are drawers filled with fittings, silk shades, &c.

There is also on the same floor a room for the stocking of the Company's price-lists and circulars relating to the goods of the different makers (no preference being given to one manufacturer over others); and another where burners, mantles, chimneys, globes, &c., of all kinds are to be found.

Above this there are the offices and dining-rooms for the staff. The larger of the latter is at times used for the purpose of cookery demonstrations; there being a kitchen fitted up at one end of it. Every room is provided with a thermostat connected to a Pearson fire-alarm installation; and there are hydrants distributed over the building. Each floor has its responsible fireman and his assistant; and representatives from Messrs. Merryweather visit the place periodically to see that the men thoroughly understand their work.

We regret that we are not able to include with this notice a view of the outside of the building as well as the photographic reproductions of the interior.

The recovery of a broken well-drill point has recently been accomplished in a well 540 feet deep at the Philadelphia Mint. The tool, 18 inches in length and weighing 19 lbs., had lodged crosswise at the bottom of the hole; and after it had been fished for unsuccessfully for ten days, the well was about to be abandoned, when an electro-magnet was tried, which at once recovered the tool and all metal particles in the hole.

Miss Mabel F. Vernon Harcourt, M.A. (Dublin), Assistant Mistress at the Notting Hill School for Girls, has been selected as lady principal of a new county high school for girls at Chelmsford, to be opened next spring under the Essex Education Committee. Miss Harcourt had a distinguished career at the Oxford High School, Holloway College, and Girton College, Cambridge, where she obtained a first class in the modern languages tripos. She is a daughter of Mr. A. G. Vernon Harcourt, F.R.S., one of the Metropolitan Gas Referees.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Quarterly Meeting at Salford.

The One Hundred and Forty-Eighth Quarterly Meeting of the Institution was held at Salford on Saturday; and the exceptionally good programme of business to be transacted (apart from the promised entertainment of the members by the Salford Corporation) induced a very large turn out.

On assembling at the Gas Offices, Bloom Street, the Institution were welcomed by the Chairman of the Gas Committee (Alderman F. S. Phillips, J.P.) and the Gas Engineer (Mr. W. W. Woodward). No time was occupied here in speech-making; but the members at once proceeded by special tramcar to the gas-works, Regent Road. Thence they journeyed to the Liverpool Street works; and from there to the Albion Street works—in this way inspecting the three separate systems of carbonization for which Salford is renowned.

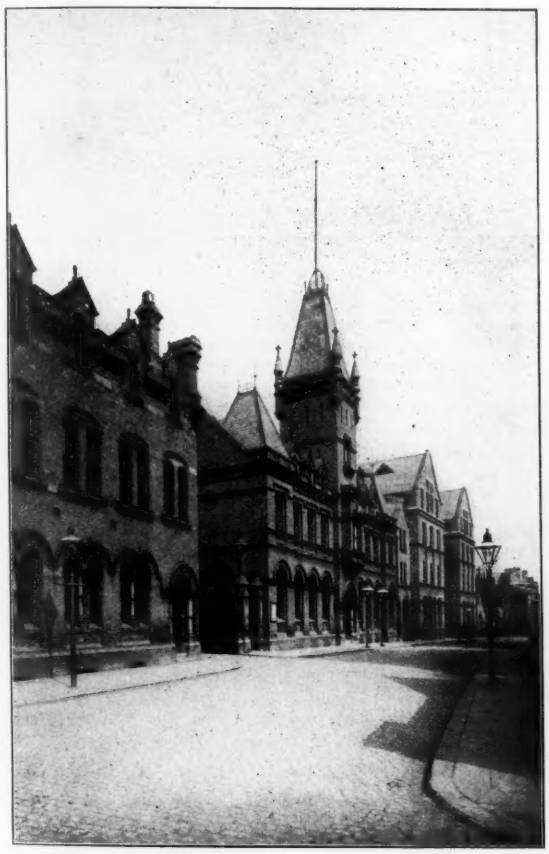
On reaching the Town Hall, Bexley Square, a sumptuous luncheon was provided, at which Alderman Phillips presided, with the Mayor of Salford (Alderman Frankenburg) and Mr. J. H. Brearley, the President of the Institution, supporting him left and right. Subsequently the Chairman proposed "Success to the Institution;" and in doing so recalled the interesting circumstance that Salford was a pioneer in the matter of gas lighting. It was the first town in England to have its streets lighted by gas, and the first also to make the experiment of lighting a factory by gas. There were also a few other toasts.

THE SALFORD GAS-WORKS.

The following particulars regarding the Salford gas undertaking and the area of supply were contained in a pamphlet which was distributed among the members.

History and Extent of the Undertaking.

The manufacture of coal gas in Salford dates back to the year 1804, when Mr. George Lee, of the firm of Messrs. Phillips and Lee, had his house in Chapel Street lighted by gas. The experiment was so successful that in the following year the extensive



Bloom Street Gas Offices.

Chapel Street Stoves Department and Show-Rooms.

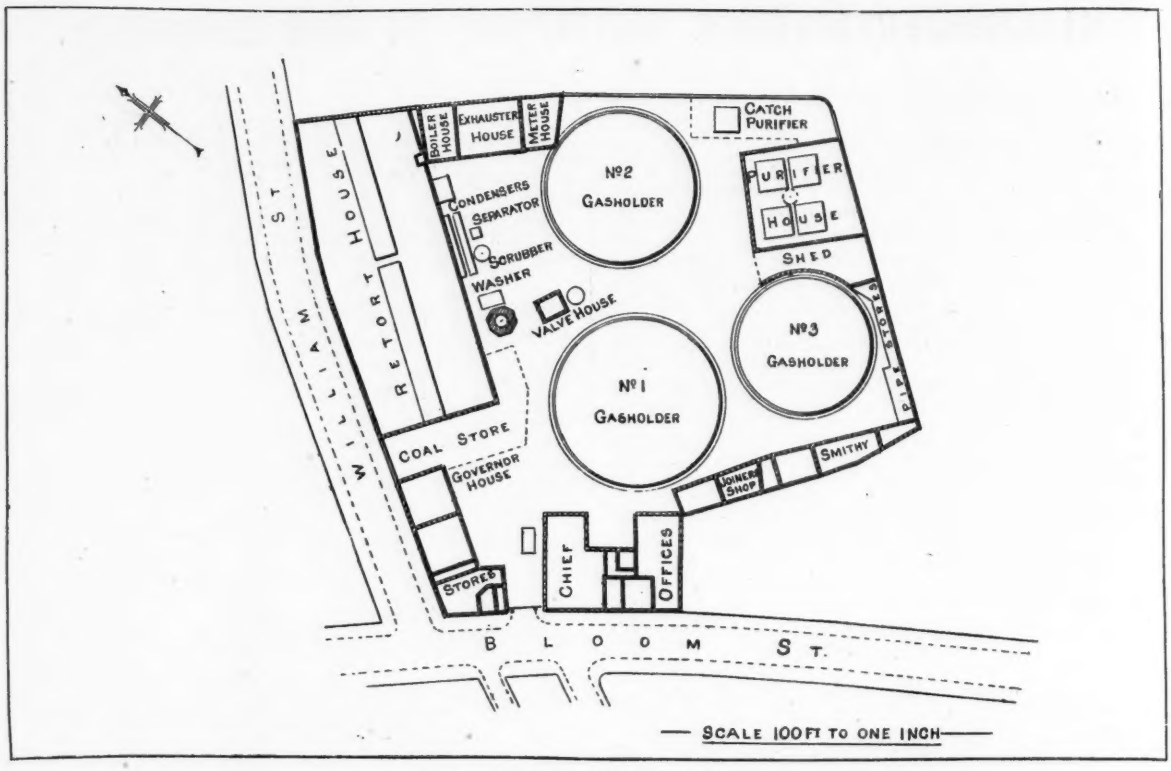
cotton mills of the firm (also situated in Chapel Street, and now known as the Bonding Warehouse) were thus lighted; the work being carried out under the direction of William Murdoch. Works for the supply of gas to the public were erected in 1819 by private enterprise. They were situated in Clowes Street, and were purchased by the Police Commissioners in 1831. Three years later the Commissioners commenced the erection of new works in Lamb Lane (now called Bloom Street); and in 1836 gas was first manufactured there—the old works in Clowes Street being abandoned shortly afterwards. In 1844, a Charter of Incorporation was granted to the town; and the gas-works then came under the control of the Corporation.

The works erected in Lamb Lane were extended from time to time, and sufficed for the needs of the town until 1858, when the building of the Regent Road works was commenced. The consumption of gas had in 1868 increased to such an extent that it was found necessary to acquire more land. A plot was secured in Liverpool Street; and the erection of works there was commenced the following year. It again became necessary in 1891 to consider the extension of the works; and a plot of land was purchased in Albion Street, where building operations were commenced two years later. The accommodation at the Chief Offices in Bloom Street having become inadequate, extensive premises were in 1905 purchased in Chapel Street; and the Stoves Department was transferred there this year.

In addition to the Borough of Salford, gas is at present supplied to the districts of the Corporation of Eccles, the Swinton and Pendlebury Urban District Council, the Worsley Urban District Council, the Prestwich Urban District Council (portion only), the Little Hulton Urban District Council (portion only), the Irlam Urban District Council, and the Barton-upon-Irwell Rural District Council (portion only).

The extreme length of the district supplied is 11¼ miles, and the extreme width 7¼ miles; the total area being about 40 square miles, with an estimated population of about 350,000. The total length of the mains laid, which vary in diameter from 2 inches to 36 inches, is 270 miles.

The number of consumers is 63,165, of which 23,388 are supplied through prepayment meters. Gas-cookers to the number of 4069 are out on hire; and there are 9539 public lamps. The make of gas during the past year was 1,604,974,000 cubic feet; and the total capital expenditure up to March 31 last amounted to £869,005. The four manufacturing stations—Bloom Street, Regent Road, Liverpool Street, and Albion Street—occupy a total area of about 15 acres, and have a carbonizing capacity of 834 tons of coal per 24 hours.



Plan of the Bloom Street Gas-Works.

Bloom Street Works.

The Bloom Street works, at which are situated the chief offices of the department and the meter making and repairing shops, cover an area of about 2¼ acres, and have a carbonizing capacity of 84 tons of coal per 24 hours. The manufacture of gas is, however, only carried on at these works during the winter months. Being the oldest works in the borough, the carbonizing and purifying plants do not present any features of special importance.

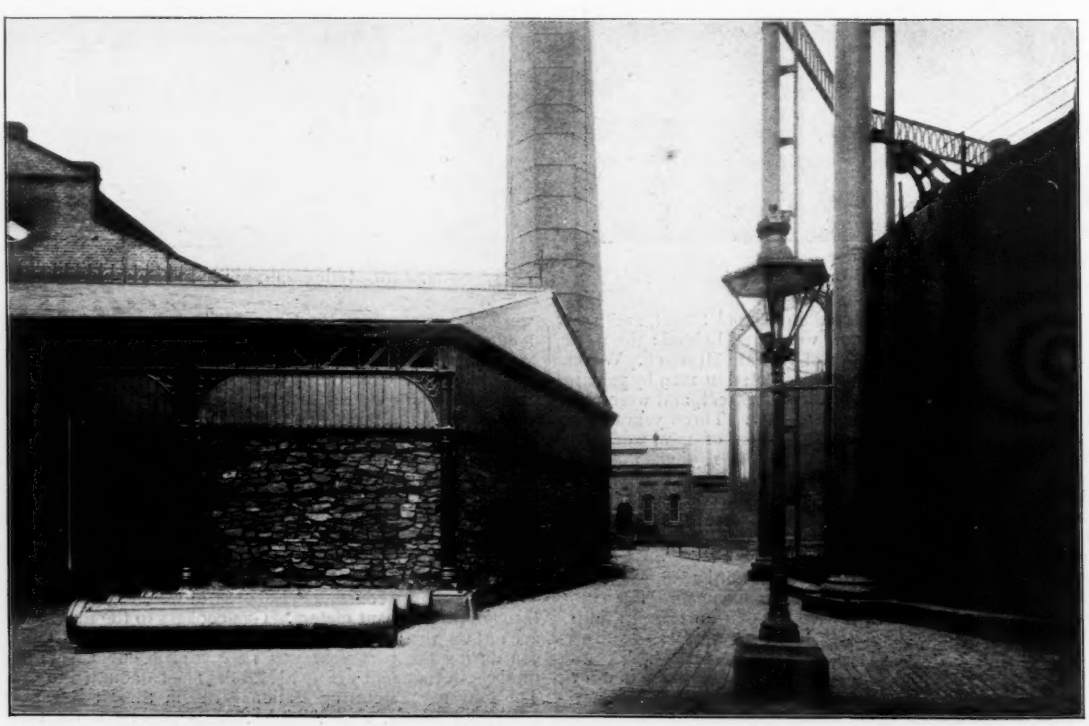
The station meter has a measuring capacity of 50,000 cubic feet per hour; and the holders (which are three in number) have a total storage capacity of 900,000 cubic feet. There are two 30-inch station governors which control the pressure to the Broughton district and to a portion of the Salford district. As the districts supplied through these governors require a much larger quantity of gas than is made at the Bloom Street works, the supply is augmented from the Liverpool Street works by means of a 24-inch high-pressure main connecting the two works.

The most interesting and modern portion of the works is the meter department, where the Corporation have for some years carried on the manufacture of consumers' meters.

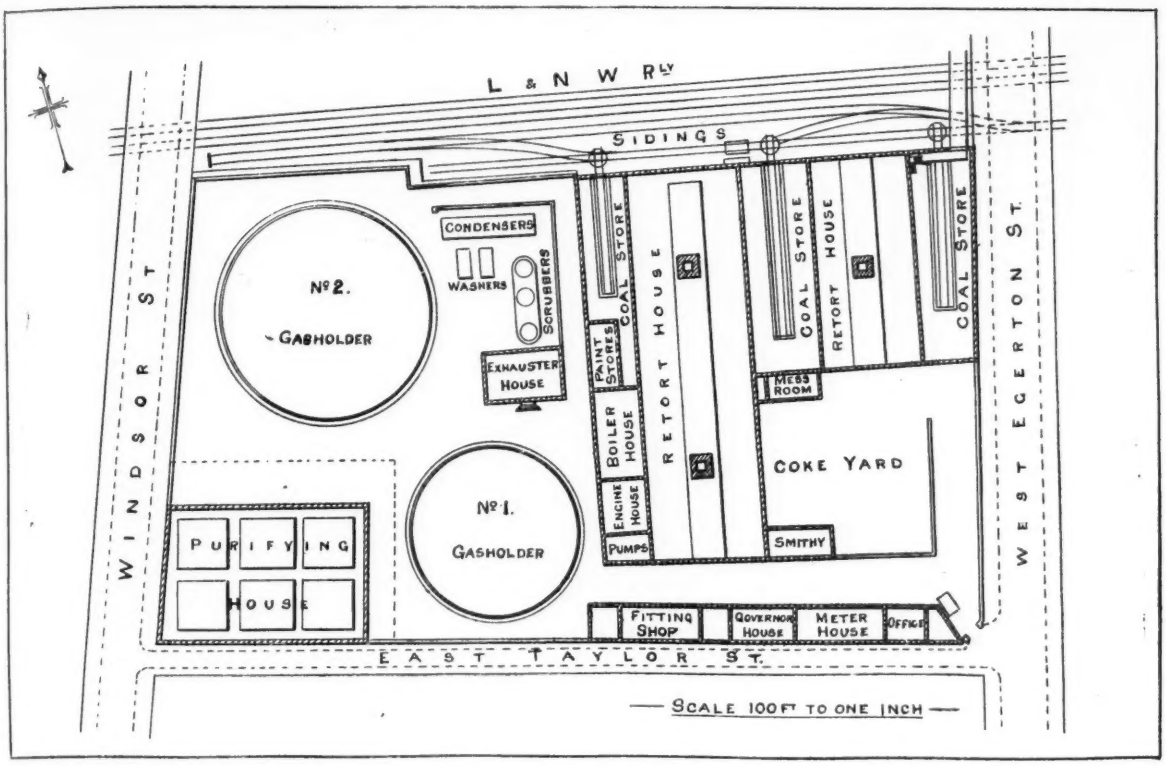
Regent Road Works.

The Regent Road works, which are situated on the south side of the London and North-Western Railway, near Cross Lane Station, cover an area of about 3¾ acres, and have a carbonizing capacity of 240 tons of coal per 24 hours.

There are two retort-houses, containing together 212 through D-shaped horizontal retorts. In the larger of these houses the work of charging and drawing the retorts is effected by hydraulic



Bloom Street Gas-Works.



Plan of the Regent Road Gas-Works.

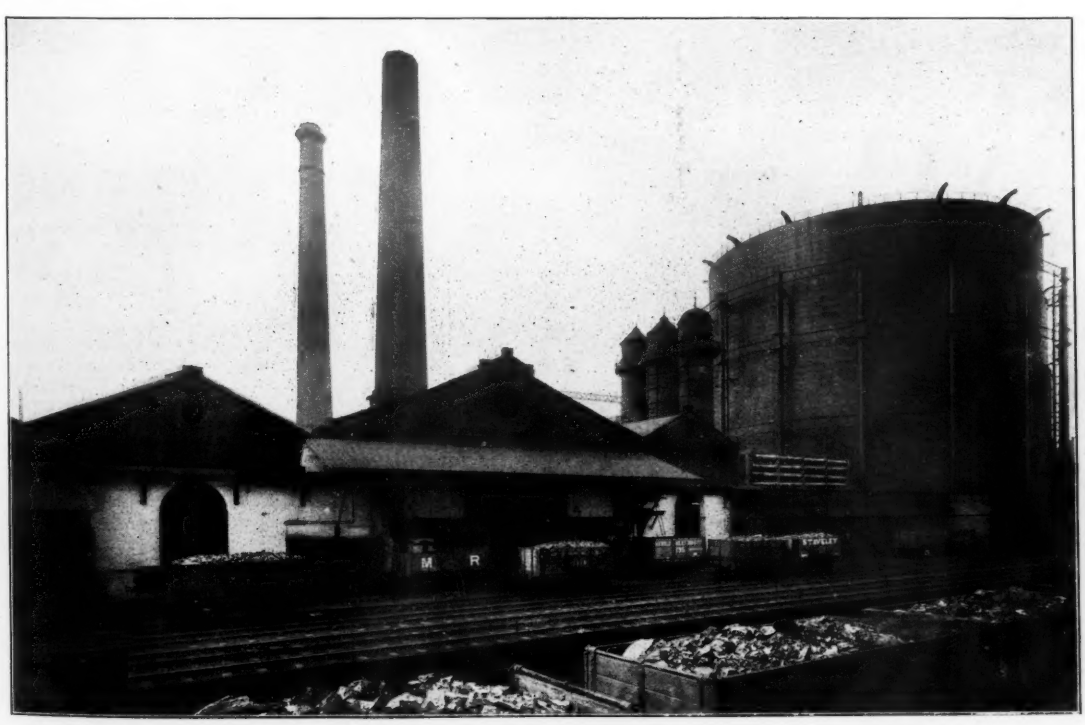
machinery of the Foulis type, fitted with West's scoops. The coal for use in this house passes directly from the railway waggons into breakers, where it is broken to a convenient size. It is then elevated and conveyed to the charging-machines by gravity bucket conveyors. The hydraulic power required for working the machines is obtained by means of a pair of high-pressure horizontal steam-engines driving two differential ram-pumps. The coal breakers and conveyors are driven by two high-pressure horizontal steam-engines.

The condensers are of the horizontal type; the bottom tier of pipes being immersed in a tank of water. The exhausters are of the horizontal reciprocating type, and are capable of passing 160,000 cubic feet of gas per hour. There are two washers and three tower scrubbers. The purifiers are six in number, each 30 feet square by 6 feet deep. The covers of these purifiers are lifted by means of screws worked by worm and wheel gearing. The three station meters have a total measuring capacity of of 120,000 cubic feet of gas per hour, and the two telescopic gas-holders a combined storage capacity of 2,400,000 cubic feet. There are three station governors—one 30-inch, which controls the pressure to the Eccles district; and two 24-inch, controlling the pressure to Ordsall and to a portion of the Salford area.

Liverpool Street Works.

The Liverpool Street works, which are situated on the north side of the London and North-Western Railway, near Cross Lane Station, are connected with the Regent Road works by a foot-bridge. The works cover an area of about 7 acres, and have a carbonizing capacity of 308 tons of coal per 24 hours.

There is one retort-house containing 224 through Ω-shaped



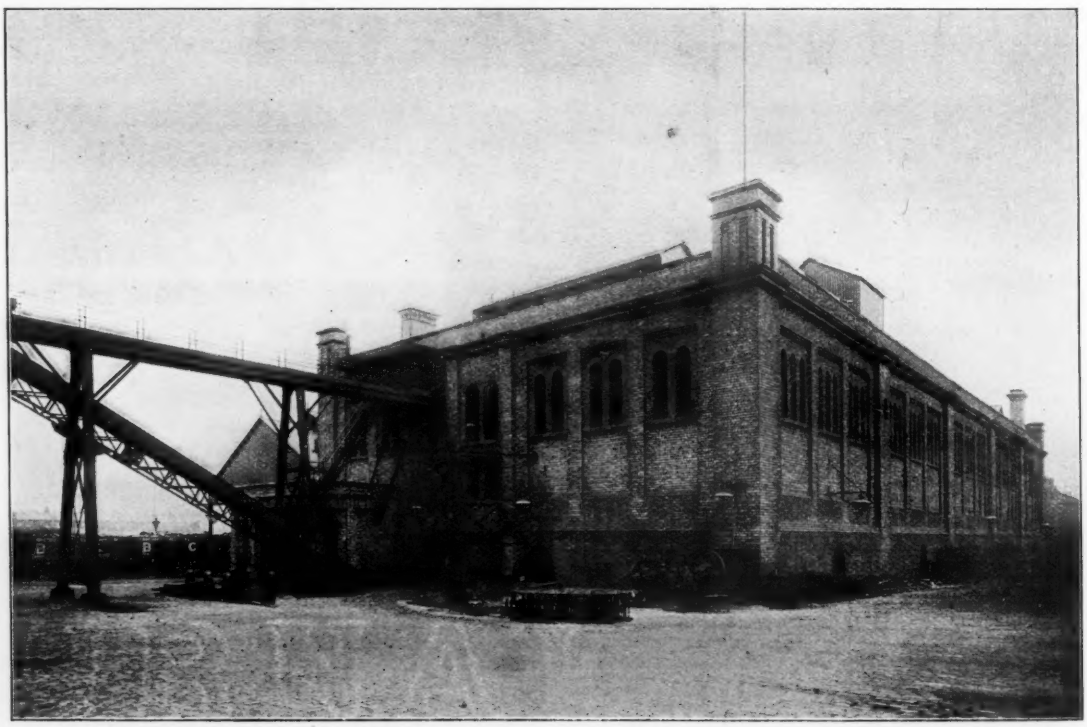
Regent Road Gas-Works.

Liverpool Street Gas-Works.

horizontal retorts. The retorts are charged by electrically-driven stoking machinery of the De Brouwer projector type. The coal required is supplied in railway waggons, which are lifted from the siding level on to the elevated railway over the coal-stores by two 20-ton hydraulic waggon hoists. The power required for working these hoists and the other hydraulic machinery used on the works is obtained by means of two pairs of high-pressure horizontal steam-engines, driving two pairs of differential ram-pumps. The coal is discharged from the waggons into breakers, where it is broken to a convenient size. It is then elevated and conveyed to overhead storage hoppers, spaced at about equal distances along one side of the retort-house. From these hoppers the coal drops into the hopper of the charging-machine as required.

The retorts are discharged by an electrically driven telescopic ram of the "Jenkins De Brouwer" type. The coke falls from the retorts on to a De Brouwer coke-conveyor, which runs in front of the retort-bench on the opposite side to the stoking machinery; and it is carried by this conveyor to the end of the retort-house, where it is quenched, elevated, screened, and deposited into hoppers. In addition to the stoking machinery, the coal and coke handling plant is electrically driven. The current being supplied by a Mather and Platt 50 kilowatt generator, direct coupled to a high-speed Crossley gas-engine.

The condensers are vertical; one set being of the atmospheric type, and the other of the water-tube type. There are two pairs of rotary exhausters, each pair capable of passing 200,000 cubic feet of gas per hour. There are four tower scrubbers, and three rotary washers. The purifiers are twelve in number, in two sets of six boxes each. The boxes in the first set are 24 feet square by 6 feet deep, with covers lifted by hydraulic rams. The second set are 28 feet square by 6 feet deep, with covers lifted by rope-driven travelling cranes. The two station meters have a total measuring capacity of 200,000 cubic feet of gas per hour; while the two telescopic gasholders have a combined storage capacity



Albion Street Gas-Works.

of 4,000,000 cubic feet. There is one 24-inch station governor, which controls the pressure to the Pendleton district.

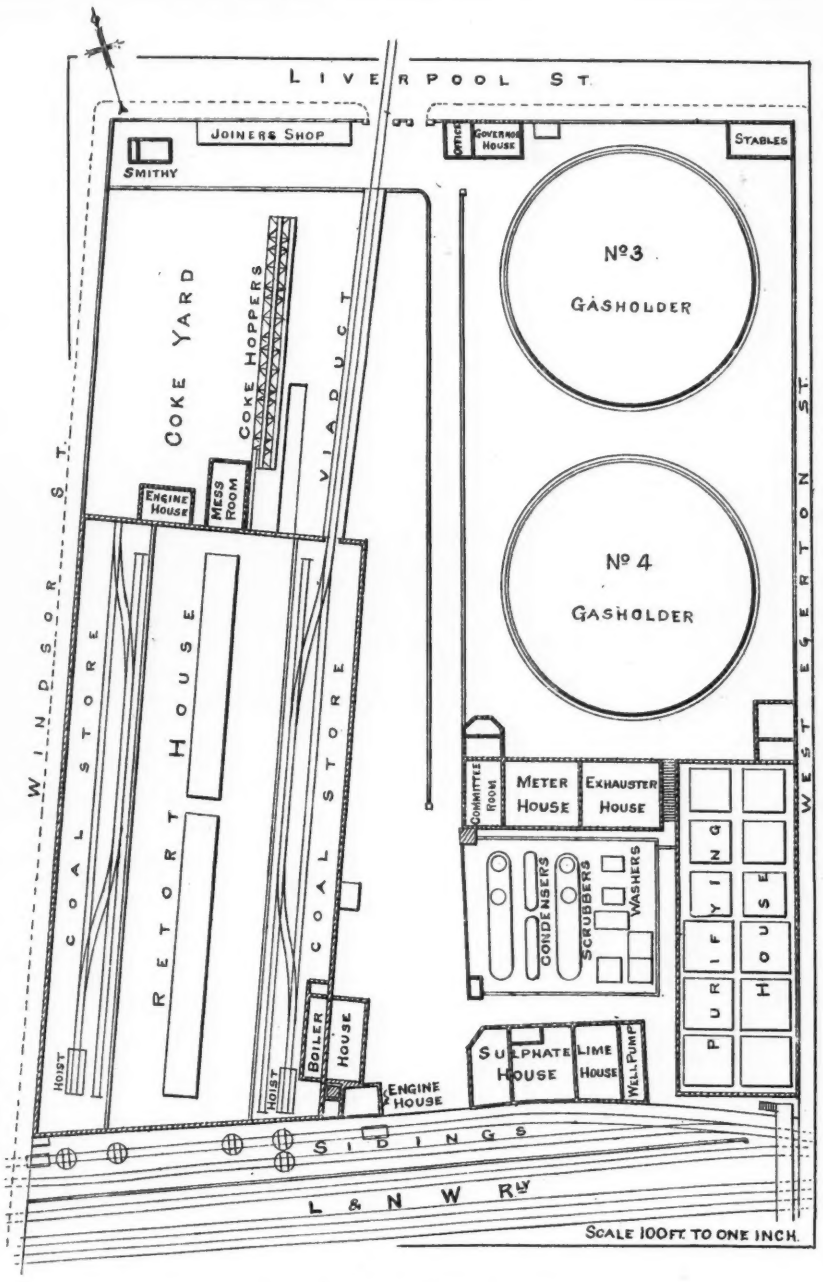
The sulphate of ammonia plant, which deals with the liquor produced at all the works, is capable of turning out about 9 tons of sulphate per 24 hours. The total quantity manufactured last year was 1833 tons. The water required for cooling the gas, quenching the coke, and for use in connection with the sulphate plant, is obtained from an artesian well. The boring is 500 feet deep, and varies from 26½ inches to 15 inches in diameter. The pumping is done with a single-acting lift and force pump, having a capacity of 10,000 gallons per hour. The pump is driven through helical gearing by means of a horizontal high-pressure steam-engine.

Albion Street Works.

The Albion Street works—situated at the junction of Albion Street with Liverpool Street—are connected with the Liverpool Street works by a subway, and have direct railway communication with the Lancashire and Yorkshire and London and North-Western Railways. The works cover an area of about 2 acres, and have a carbonizing capacity of 202 tons of coal per 24 hours.

There is one retort-house, designed to contain four benches of inclined retorts; but at present only three benches, containing 56 through D-shaped retorts each, are erected. These retorts are built at an angle of 32°. The coal falls from the railway trucks into breakers below; and after being broken, it is transported by means of elevators and conveyors into large storage-hoppers placed above the retort-benches. Small three-compartment hoppers of the Shoubridge type, which travel on elevated rails in front of the retort-benches, convey the coal from the large hoppers to the retorts as required. The coalbreakers, elevators, and conveyors are driven by two gas-engines. The coke is discharged on to a De Brouwer coke-conveyor, which runs in front of the retort-bench; and it is carried by this conveyor to the end of the retort-house, where it is quenched, elevated, screened, and deposited in hoppers. The coke-conveying machinery is driven by a gas-engine.

The gas manufactured at the Albion Street works is purified, measured, and stored at the Liverpool Street and Regent Road works.



Plan of the Liverpool Street Gas-Works.

Stoves Department and Show-Rooms.

The Stoves Department is housed in premises situated at the junction of Bloom Street with Chapel Street. The building covers an area of 170 square yards, and is three storeys high. Large well-lighted show-rooms are provided on the ground and first floors, where consumers may inspect the latest designs in gas appliances. There are also branch show-rooms in the Eccles and Swinton districts.

The meeting for the transaction of the business before the members was held in the Council Chamber, Salford; Mr. J. H. Brearley, of Longwood (the President), in the chair.

The Hon. Secretary (Mr. H. Kendrick, of Stretford) read the minutes of the last two quarterly meetings; and they were duly confirmed.

Votes of Thanks.

A vote of thanks was unanimously accorded to the Mayor and Corporation of Salford for placing the Council Chamber at the disposal of the Association for the purpose of holding the meeting. A vote of thanks was also passed to Alderman F. S. Phillips, J.P., the Chairman of the Salford Gas Committee, for the entertainment he had provided for the members.

Appointment of Scrutineers.

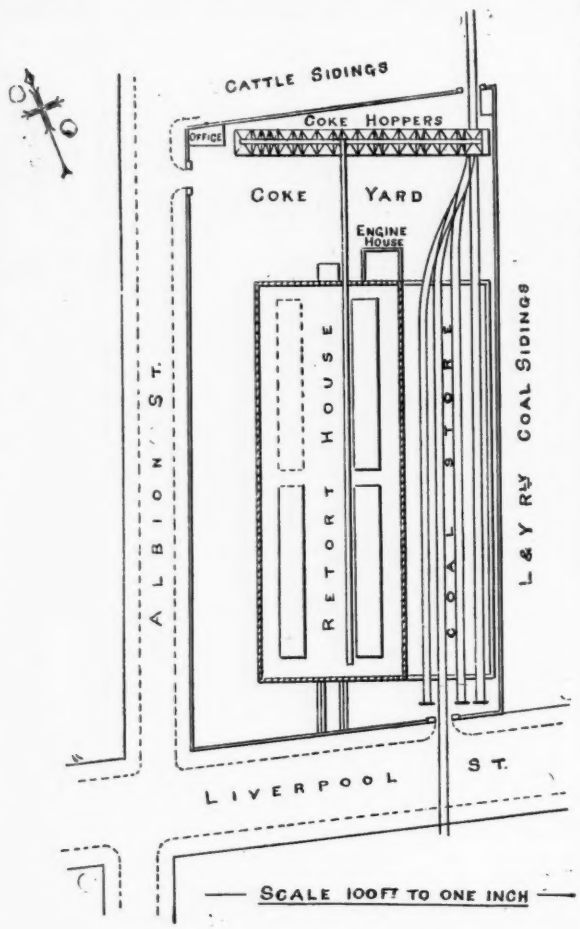
Messrs. Pickles and Turner were appointed Scrutineers of the ballot-papers.

The Benevolent Fund of the Institution.

The President called attention to the receipt by the Hon. Secretary of the letter which has been circulated by Mr. Walter T. Dunn, as Hon. Secretary of the Benevolent Fund of the Institution of Gas Engineers, among the District Associations with regard to the obtaining of further subscribers to the fund. He said he thought the object for which their support was asked was a worthy one; and though he had not hitherto subscribed to the fund in question, he proposed to do so in future. He would like to see as many members as possible place their names in the hands of the Secretary, stating the amount of their intended annual subscription.

Mr. Isaac Carr (Widnes) said he had felt some degree of disappointment that there was not some recommendation from the Committee to the effect that a grant should be made from the surplus funds of the Institution. If this were done, it would still be open to the generous minded to make a special contribution of their own. The example of the Institution would be followed by the other District Institutions, and in this way a very handsome contribution would be made to the Benevolent Fund.

Mr. S. Meunier (Stockport), in reply to Mr. Carr, said the question had been discussed by the Committee; but it was felt that, in the present condition of their funds, and the spirit of spending which had been prevalent for some time past, it would not be advisable to do as had been suggested. For the present, it would be better to leave the contributions to the generous impulses of the individual members. Mr. Carr's suggestion would be borne in mind by the Committee.



Plan of the Albion Street Gas-Works.

The PRESIDENT felt, with Mr. Meunier, that the present finances of the Institution would not allow of the distribution of such a sum as would adequately represent what should be their donation to the fund. He promised Mr. Carr that his suggestion would be laid before the next meeting of the Committee; and it would probably be placed before a meeting of the Institution on a future occasion, with or without a recommendation from the Committee. He was reminded by the Secretary that the minimum subscription to the Benevolent Fund was now only 5s., and not 10s. 6d. as heretofore.

THE "QUESTION-BOX."

The PRESIDENT then moved—"That the resolutions establishing a 'Question-Box' be rescinded." He said the subject had been thoroughly debated by the Committee, who were unanimously of opinion that, owing to the lack of support from the members, the "Question-Box," so far as they were concerned, had not been a success.

Mr. MEUNIER seconded the motion. He confessed that it had been his view that the "Question-Box" would result in an extension of their own knowledge, and have a good effect on the industry generally; but, much to his disappointment, the questions had been very few. Those that were chosen had to be built up and answered by the Committee. Not a single reply had been received in response to a circular which had been sent out asking for further questions and answers. In these circumstances, if the members could not help themselves, it was not fair to ask the Committee to do the work for them.

Mr. R. WATSON (Doncaster) said those who had not contributed to the "Question-Box" quite appreciated that the Committee had done a good deal in answering the questions. One member especially had been very assiduous in taking up the work that ought to have been done by others; and for this he was entitled to the thanks of the members. There was one additional reason why it would be advisable to drop the project, and that was that if it were pursued it would make it very much more difficult for the Committee to get papers to be read at the quarterly meetings. One rather gathered from the opening sentences of Mr. Allen's paper (prints of which had been placed in their hands) that there was some difficulty in getting papers for the meetings; and he thought this ought not to be accentuated by having what were really short essays or papers intended for a different purpose altogether. He had, therefore, great pleasure in supporting the proposition.

The resolution was carried unanimously.

THE QUARTERLY REPORTS.

The PRESIDENT called attention to the following recommendation of the Committee: "That the present style of quarterly reports be discontinued, and that members, upon giving notice to the Secretary, and the payment of 2s. 6d. in addition to their subscription, be supplied with a copy of the Reports of the Proceedings of the Gas Associations of the United Kingdom, issued by Mr. Walter King." In further explanation of this recommendation, and as it apparently contradicted his predecessor, Mr. Meunier, he might say that, though they had a small surplus fund, they had not nearly enough to adequately meet Mr. Carr's suggestion with regard to the Benevolent Fund. If the members thought that any surplus they might have should be devoted to the Benevolent Fund in preference to the recommendation which he now put before them, this was the time to say so. He might mention that the Committee had very carefully debated this proposal. He did not doubt that a good proportion of the members bought the collected reports at the published price, and it was their intention to supply the members at the reduced charge of 2s. 6d., at which figure he did not think any member of the Institution need be without the book. The only way that this could be brought about was by having recourse to the funds of the Institution. The book contained complete reports of the proceedings of all the District Associations; and though the members might not want them now, probably those who were beginning to buy the reports would find in subsequent years that they had done wisely by putting them on their book-shelves.

After considerable discussion, the resolution was carried.

Mr. J. H. CROWTHER (Wallasey) thereupon gave notice of motion for the next meeting, to the effect that, if necessary, the members' subscription should be raised to 15s.—to include a copy of the book.

REPORT ON THE GAS EXHIBITION IN MANCHESTER.

The SECRETARY read the following report:—

Report of the Advisory Committee on the Gas Exhibition, Manchester, 1907.

Your Committee, in accordance with general instructions given them last year, appointed a Sub-Committee to arrange for an Exhibition of Gas Appliances to be held in Manchester in the autumn of 1907.

After several meetings, it was decided that the only available building, in a central position, was St. James's Hall; and the Manager of that place was approached, and he entered heartily into the scheme. He finally offered to take all risks, pay all expenses, and provide the Institution with funds for the purpose of promoting lectures to consumers, manufacturers, and plumbers and gas-fitters, in return for the patronage and support of this Institution and the gas undertakings they represent. This offer was, in the end, accepted; and an Advisory Committee—consisting of Messrs. T. Newbigging (President), J. H. Brearley, and W. Prince (Vice-Presidents), J. H. Crowther, T. Duxbury, S. Meunier, J. G. Newbigging, and W. W. Woodward, with Messrs. Kendrick and Whatmough as Hon. Secretaries, was appointed.

This Committee has had several meetings, and fixed the date of the exhibition to open on Wednesday, the 23rd of October, and to close on Saturday, November 9, 1907; and to be styled an "Exhibition of Gas Appliances (Industrial and Domestic) and Gas Lighting."

A circular and prospectus have been drawn up, and will shortly be issued to probable exhibitors; the groups being as follows:—

Division 1. Outdoor Lighting.
" 2. Interior Lighting.
" 3. Cooking.
" 4. Heating.
" 5. Ventilating.
" 6. Motive Power.
" 7. Industrial Uses of Gas.
" 8. Coke Burning Stoves, &c.
" 9. Tar Products, Dyes, &c.
" 10. Gas Plant Models and Gas-Testing Apparatus.

The Advisory Committee desire to make a special effort to have a unique exhibit under Division 7—Industrial Uses of Gas—by introducing apparatus for gassing yarns, hatting, metal work, and special processes in the many workshops of the district for which gas can be used; and it is hoped that the makers will show their latest productions in all divisions.

By arrangement with the Manager, all applications and charges for space and services will be submitted to the Advisory Committee before being finally accepted; and the lighting and ventilating of the building will be sub-let to competent firms, under the advice of the Advisory Committee.

Circulars have been issued to all the members asking for the patronage of the undertakings, and for particulars of any special plant made in their area for the use of gas in manufacturing processes. The promises of support up to date are very gratifying; no refusals having to be chronicled.

The following have approved the exhibition, and promised their support:—

Corporations.

Manchester	Oldham	Stoke-on-Trent
Salford	Bolton	Cleckheaton
Bradford	Warrington	Macclesfield
Stockport	Heywood	

Urban District Councils.

Wallasey	Llandudno	Bollington
Clitheroe	Lytham	Huyton
Ossett	Skipton	

Companies.

Liverpool	Glossop	Wilmslow
Sheffield	Elland	Rainhill
Wakefield	Normanton	Market Drayton
Stretford	Fleetwood	Castleford
Longwood	Frodsham	Wirksworth
Northwich	Prescot	Heckmondwike
Altrincham		

The co-operation of the Society of British Gas Industries has been requested; and we are trusting to receive a favourable reply.

The Advisory Committee desire to make this exhibition an object-lesson to the public, gas-fitters, plumbers, manufacturers, architects, and all those interested in smoke prevention; and as there has not been previously any really representative gas exhibition in the Manchester district, the Committee hope to receive the active support of every member of the Institution, when the success of the venture will be placed beyond all doubt, and the marvellous developments of the uses of gas in every department of the home-life and the industries will be fully brought home to the public, and a great impetus given to the undertakings with which all of us are associated.

On behalf of the Committee,

J. H. Brearley, Vice-President.
H. Kendrick, Hon. Secretary.

Mr. Watson asked if the period during which the exhibition was to be held was sufficiently long, having regard to its great importance.

The President said it was as long as they could get the St. James's Hall for. The hall was engaged both prior to and after the dates named, and they had either to accept them or defer the exhibition till next year, which he did not consider desirable.

Papers and Discussions.

On the suggestion of the President, it was agreed that the papers should be taken as read, owing to the limited amount of time at the disposal of the meeting.

The first paper was by Mr. Samuel Glover (St. Helens), the subject being "A New Apparatus for Preparing Lime for Gas Purification." It will be found, with a report of the discussion, on p. 603.

Mr. George Stevenson (Long Eaton) presented the next paper, entitled "Experiences in Competition for Power." It is given on p. 611, with the discussion upon it.

The third paper on the *agenda* was by Mr. E. Allen, of Liverpool, on "High *v.* Low Grade Gas." Owing to indisposition, the author was unable to be present; and the discussion on the paper, which will be found on this page, was deferred.

Report of the Scrutineers.

The report of the Scrutineers showed that the ballot for the election of office-bearers for the ensuing year had resulted as follows:—

President.—Mr. W. Prince (Stoke-on-Trent).
Vice-Presidents.—Mr. T. Duxbury (Oldham) and Mr. John Wilkinson (Halifax).
Treasurer.—Mr. T. Newbigging (Manchester).
Hon. Secretary.—Mr. H. Kendrick (Stretford).
Committee.—Messrs. J. C. Belton (Chester), J. S. Naylor (Rotherham), R. Watson (Doncaster), and W. Everitt (Ilkley).
Auditors.—Mr. C. Elliott (Leyland) and Mr. W. L. Donaldson (Lymm).

New Members.

The following new members were elected: Mr. A. Bromley, of Batley; Mr. W. Smith, of Bolton; Mr. R. F. Stoddard, of Holyhead; Mr. J. W. Thompson, of Barnoldswick; and Mr. W. Whitley, of Kirkburton.

Mr. Prince thanked the members for his election as President, and said he hoped to show in the succeeding year that their confidence had not been misplaced.

A vote of thanks to the contributors of the papers concluded the proceedings.

Analytical Examination of High-Percentage Gases.—A recent number of the "Comptes Rendus" contained an article on this subject by Messrs. Alfred Stock and Carl Nielsen. It showed that the ordinary absorption methods of determining gases are inaccurate because of the solvent power of water on gases, especially air. This inaccuracy becomes very great when pure or very high-percentage gases are used. The authors suggest an improved apparatus for their estimation. Thus, to determine accurately a gaseous residue of less than 1 per cent. in oxygen, they fuse to an ordinary Hempel burette a measuring pipette of 1 c.c. volume. This is connected with a cock with capillary bore, through which the gas is introduced. Instead of bringing back into the burette the gaseous residue freed from oxygen in the gas pipette, they read its volume off in the 1 c.c. pipette. For the absorption of the oxygen they use either copper wire gauze in ammonia solution containing carbonate, or alkaline ferrotartrate solution. It is generally assumed that, by boiling and cooling rapidly, water can be freed from air; but the authors have found that air is again quickly absorbed when the water comes into intimate contact with air. For example, on filling a long gas-burette the water contains no air only as long as it is kept from contact with air.

SOME NOTES ON HIGH VERSUS LOW GRADE GAS.

By Edward Allen, of Liverpool.

[**A Paper presented to the Manchester District Institution of Gas Engineers.**]

During recent years there has been a movement on the part of the manufacturers of gas to reduce the standard of illuminating power. In London and the Provinces, by companies and corporations alike, the direction in respect of quality has been downward. If reference is made to any directory of gas undertakings, it will be noticed that in one and the same column are given "Candle Power" and "Price." The connection is inevitable; and the downward movement in quality was made so as to achieve a reduction in price.

To satisfy the statutory obligation where the standard exceeded say 14 candles, a certain proportion of cannel coal was required; and as the supply of that material was inadequate to meet the demands of the Home and Foreign Markets, prices rose to a high level. Relief from this heavy burden was sought in the adoption of other methods of enrichment. Carburetting by benzole or carburine, the Peebles oil-gas process, and carburetted water gas, relieved the situation, but a radical alteration was found in the substitution of a lower standard for many undertakings.

The movement was a bold one in view of the fact that the great bulk of the gas for lighting was at that time used in flat-flame burners; and the effect of the reduction was seen in the greatly diminished illumination. Some amelioration was granted by improvements in burners; and many gas authorities wisely interested themselves in the matter of instructing their customers how to make the best use of the gas supplied. But even in the best flat-flame burner, a light of 10 candles for a consumption of 4 cubic feet of gas per hour was a poor show; and the rival electric light was enabled to seize a position from which it has been difficult to drive it.

It was fortunate for the gas industry that the practical success of the incandescent gas-burner followed closely on the heels of low-grade gas. A new era in the history of gas was established; and Dr. Auer's invention has given it a leading position in the field of competition.

The success of incandescent gas lighting is almost the despair of electricians; and they find themselves outstripped in the race. In public streets, shops, churches, and halls, there is a return to gas lighting, because of its greater efficiency and economy; and until some cheaper method of production is discovered, or more efficient lamps are invented, electricity must yield pre-eminence to gas. It must not be supposed, however, that this success was won by low-grade gas *per se;* but it was its ally, the incandescent gas-burner, that turned an impending defeat into a most glorious victory.

The question of "High *versus* Low Grade Gas" is one of very great general concern to those who are responsible for its manufacture and supply. It goes without saying that in every business the seller's great aim is to serve the best interests of the buyer. It may be that some buyers suspect the seller's motive, and think that he is trying to get the better of them; and it is in the case of some sellers quite necessary to watch them. But the sellers of gas are, of course, quite outside of that category.

It may be granted, therefore, that the claims of high or low grade gas for acceptance by each gas authority must rest upon their suitability to the best interests of their consumers. The question is not which is the cheapest gas, but which will give the cheapest light, the cheapest heat, and the cheapest power? It is necessary, also, to ascertain what proportion each of these classes of business bears to the whole; so that the best average result shall follow from the course decided upon.

It would be most improper for any person to dogmatize on the subject. The local conditions and circumstances of each district vary so much that a policy may be successful in one, and very unsatisfactory in another locality. Or it may be that the extreme and hasty application of a policy that commended itself on general grounds would lead to almost disastrous results.

The author of this paper declines to dictate on the question of high *versus* low grade gas; but having given very careful consideration to the subject as affecting his own Company's district, he submits the following notes, in the hope that they may be found of interest to members of the Institution.

In Liverpool, the standard of illuminating power was fixed by Parliament to be "such as to produce from a batswing or fishtail burner consuming 5 cubic feet of gas per hour, a light equal in intensity to the light produced by not less than twenty sperm candles of six to the pound, each burning 120 grains per hour." This high quality is not maintained without great care and attention. Provision has to be made for intensely cold and changeable weather; the quality of the materials and the behaviour of the plant are constantly under observation; and under no circumstances is the illuminating power allowed to fall below the standard. There is no gas so closely tested by the public officials as that of Liverpool, and their evidence year after year is eminently satisfactory.

The cost of materials required is, however, considerable; and this makes the price of gas comparatively high. It is fortunate that the price of cannel has been considerably reduced in consequence of the adoption of lower-grade gas in other towns, and therefore lessened the demand for that material. The low

cost of carburetted water gas also enables 20-candle gas to be produced at a lower cost than would be incurred if cannel only were relied upon for enrichment. It was formerly stated that the cost of each candle between 16 and 20 candles, was about 1d.; but half that figure may now be taken.

Having regard to the fact that for many years 20-candle gas had been supplied, it was deemed unwise to contemplate a lower quality than 16 candles in a flat-flame burner. As a source of light, it is evident that 20-candle gas at 2s. 6d. per 1000 feet is cheaper than that of 16 candles at 2s. 4d. per 1000, thus—

Cost of Light in a Flat-Flame Burner.

Illuminating Power.	Price per 1000 C.Ft.	Cost per Candle per 1000 Cub. Feet.
20 candles.	30 pence.	1·50 pence.
16 ,,	28 ,,	1·75 ,,

The next point to be settled was the cost of light obtained from the two qualities when used in incandescent burners. For this purpose, a great number of photometer experiments were made at the Garston works during August, September, and October, 1904, and also during March, April, and May, 1905. The 20-candle gas was a mixture of coal gas (some cannel also being used) having an illuminating power of about 17 candles, and an equal quantity of carburetted water gas of about 24-candle quality. The tests were of ten minutes' duration, made on a bar photometer with standard sperm candles. The flat-flame burner was Sugg's No. 7 standard steatite batwing with a rate of 5 cubic feet per hour. The incandescent burner was a Welsbach "C" burner, rated to 3 cubic feet per hour. The air supply was regulated to give the best results in each case; as a matter of fact, the air required by 16-candle coal gas was almost the same as for the 20-candle mixture. Both gases were brought close to the inlet of the photometer meter, so as to enable the experiments to follow on without much delay. The effect on the mantle when the gases were changed was very pronounced and appealed to the greatest novice in photometry.

The following table shows the average results of the experiments :—

Burner.	20-Candle Gas.	16-Candle Gas.	Difference.	
			Actual.	Per Cent.
No. 7 S. Batwing	20·61	16·47	4·14	20·09
Welsbach "C" .	74·70	63·54	11·16	14·94

Cost of Light to the Consumer.

Welsbach "C" Burner.	Illuminating Power.	Price per 1000 C. Ft.	Cost per Candle per 1000 C. Ft.
20-Candle Gas .	74·70	30 pence	0·416 pence
16 ,, ,,	63·54	28 ,,	0·440 ,,

The inevitable conclusion to be drawn from these experiments was that a reduction in illuminating power would be detrimental to the interests of the consumers when gas was used for light, whether in a flat-flame or an incandescent burner.

Subsequently, similar experiments were made at the Linacre works, but covering a larger range; and the results are shown in the following table. It should be stated that the 20-candle gas contained a mixture of carburetted water gas, varying from 30 to 40 per cent. The 16-candle gas contained 50 per cent. of carbu-

TESTS OF VARIOUS QUALITIES OF GAS MADE AT THE LINACRE WORKS.

Average of Tests made July 28 to Aug. 4, 1905.

Batwing Burner.				Incandescent Burner.				Calorific Power.				16-Candle Gas Tested in "London" Argand Burner.
20-Candle Gas.	16-Candle Gas.	Actual Loss.	Loss Per Cent.	20-Candle Gas.	16-Candle Gas.	Actual Loss.	Loss Per Cent.	20-Candle Gas.	16-Candle Gas.	Actual Loss.	Loss Per Cent.	
20·00	15·70	4.30	21·5	75·14	65·16	9·98	13·2	B.Th.U. 685·00	B.Th.U. 655·00	B.Th.U. 30·00	B Th.U. 4·38	Candles. 17·04

Average of Tests made Oct. 30 to Nov. 1, 1905.

Batwing Burner.				Incandescent Burner.				Calorific Power.				12-Candle Gas Tested in "London" Argand Burner.
20-Candle Gas.	12-Candle Gas.	Actual Loss.	Loss Per Cent.	20-Candle Gas.	12-Candle Gas.	Actual Loss.	Loss Per Cent.	20-Candle Gas.	12-Candle Gas.	Actual Loss.	Loss Per Cent.	
19 72	12·70	7·02	35·60	72·68	56·81	15·87	23·21	B.Th U. 685·00	B.Th.U. 650·16	B.Th.U. 34·84	B.Th.U. 5·08	Candles. 14·65

Average of Tests made Nov. 6 to 8, 1905.

Batwing Burner.				Incandescent Burner.				Calorific Power.				10-Candle Gas Tested in "London" Argand Burner.
20-Candle Gas.	10-Candle Gas.	Actual Loss.	Loss per Cent.	20-Candle Gas.	10-Candle Gas.	Actual Loss.	Loss per Cent.	20-Candle Gas.	10-Candle Gas.	Actual Loss.	Loss per Cent.	
20·60	10·46	10·14	49·24	73·51	50·87	22·64	30·80	B.Th.U. 685·00	B.Th.U. 623·65	B.Th.U. 61·35	B.Th.U. 8·95	Candles. 12·15

Average of Tests made Nov. 13 to 15, 1905.

Batwing Burner.				Incandescent Burner.				Calorific Power.				8-Candle Gas Tested in "London" Argand Burner.
20-Candle Gas.	8-Candle Gas.	Actual Loss.	Loss Per Cent.	20-Candle Gas.	8-Candle Gas.	Actual Loss.	Loss Per Cent.	20-Candle Gas.	8-Candle Gas.	Actual Loss.	Loss Per Cent.	
20·65	8·08	12·57	60·87	72·98	43·89	29·09	39·86	B.Th.U. 685·00	B.Th.U. 601·57	B.Th.U. 83·43	B.Th.U. 12·18	Candles. 9·88

retted gas; but the other gases had no carburetted water gas mixed with them.

It is noticeable that the reduction in light—both in the flat-flame and the incandescent burner—and calorific power, bear a very close relation to each other; and the diagrams (p. 603) may be interesting in that connection.

Having demonstrated that the high-grade (20-candle) gas affords the cheapest light when used in incandescent burners, it may seem to be superfluous to say anything further. Attention should, however, be called to the very beautiful flat-flame given by Liverpool gas. It is not only the photometric value of the light, but the colour and tone of the flame—like a disc of burnished gold—that commands admiration. In many of the shops and hotels, flat-flame burners are preferred because of their cheerful glow; and although it is known that for the same consumption of gas, six times more light is given by an incandescent burner, some consumers refuse to make the change. They prefer the rays of light that resembles the golden sunshine to that which more nearly approaches the moonshine.

The colour given by 16-candle gas (considered high grade in some towns) or even a candle or two higher, lacks the glow and beauty of 20-candle quality; and probably in such cases it may be considered desirable to entirely discontinue flat-flame in favour of incandescent burners.

In regard to the heating power of high and low grade gases, there is not so much to be said in favour of the former. The loss of calorific units, if the quality were reduced from 20 to 16 candles would be 4·38 per cent.; and as the reduction in price

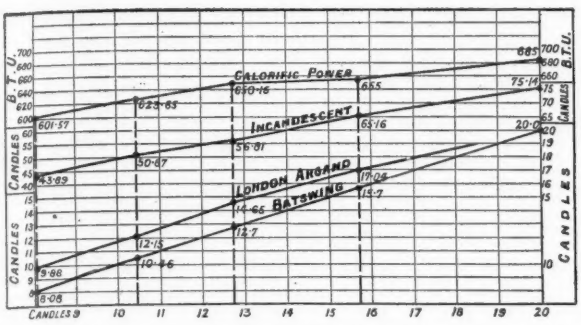


Diagram No. 1.—Showing the Results of the Tests Given in the Table.

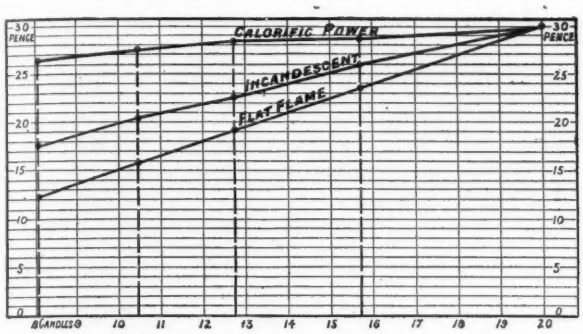


Diagram No. 2.—Showing the Value to the Consumer of Lower-Grade Gases as Compared with Twenty-Candle Gas at 2s. 6d. per 1000 Cubic Feet, on the Bases of Calorific Power and Light by Incandescent and Flat-Flame Burner.

would be 6⅔ per cent., the consumer would gain 2¼ per cent. in all the gas used for cooking, heating, and power purposes. The great bulk of gas in Liverpool is, however, used for lighting, in which a loss of about 8 per cent. would occur if the change in quality were made. Therefore, the balance is greatly in favour of retaining the present standard.

No attempt has been made in this short paper to deal with the general question of "High *versus* Low Grade Gases." It is unquestionable that a very low-grade gas, used in an incandescent burner, gives a light far in excess of that given by a very high-grade gas in a flat-flame burner. It is also evident that if the standard of illuminating power is very low, or, better still, non-existent, the gas authorities would find a wider field for coal, and be able to purchase at very low prices, with a resulting reduction in the price of gas.

Quite recently, Professor Dugald Clerk enlarged, with his usual ability, on the importance of cheap gas for power, and congratulated the Sheffield Gas Company on their success in this direction, and on so closely approaching his ideal price of 1s. per 1000 feet. This has been realized at Widnes. In that field, high-grade gas is almost useless; and where a large opening exists for such business, the seller should provide a low-grade, low-priced article.

In concluding, the author desires to emphasize his opening statement, that this paper is only intended to show the case of "High *versus* Low Grade Gas," as it might affect his own district. The gas world is not free from human frailties; and there is a danger of following a fashion set by those in high places. Let each authority weigh the merits of the case, with accurate allowance for local circumstances and conditions, before taking any action; and when even convinced that a change is desirable, never forget the wisdom contained in a phrase that has been given by a shrewd race of people—viz., "Ca' canny."

North Ireland Gas Managers' Association.

The Seventh Meeting of the Northern District of Ireland Gas Managers' Association was held last Tuesday, in the rooms of the Young Men's Christian Association, Belfast. In the unavoidable absence of the President (Mr. W. Nisbet, of Ballymena) Mr. James Brodie, of Omagh, occupied the chair. The subjects for consideration were "Advertising" and "The Adaptability of the Mannesmann Steel Tube for Street-Mains." A long discussion ensued on the latter subject, especially on the question of tapping the tube for services. After hearing arguments for and against, the members present each agreed to make a trial of the tubes and so settle the matter for themselves. A sample, with a piece of service-pipe screwed into it, was sent by the Mannesmann Company for inspection. Mr. James Nisbet, of Portadown, was elected President for the ensuing year.

A NEW APPARATUS FOR PREPARING LIME FOR GAS PURIFICATION.

By S. Glover, of St. Helens.

[A Paper presented to the Manchester District Institution of Gas Engineers.]

When the author was made aware of the Council's desire for a paper for this meeting, he explained that he was already pledged to another District Association for a paper, but that the latest thing at St. Helens was a new lime-preparing apparatus for use in slaking and conveying the lime required for purifying operations; and if the Council concluded that a description of this would be acceptable to the members, he would be quite willing to submit it to the meeting.

Before doing this to-day, the author considers a brief description of the purifying operations at St. Helens might be helpful to the study of the subject. The make of gas will this year total to upwards of 400 million cubic feet. The apparatus throughout the works is being completed for a total output of 2 million cubic feet per 24 hours. The purification of this gas is accomplished in two sets of four boxes each; the boxes being 30 feet by 18 feet by 5 ft. 6 in. deep, with four tiers of lime grids; and each set of boxes is connected up to its own station-meter. This is to keep a record of the work which has been done at any particular time by each set of boxes, and so enable us to control the flow through each set. In this way, the work is known and regulated.

The area of the purifiers per million cubic feet per day is not quite equal to that which is recommended by our old friend Mr. Newbigging. We are, therefore, at the present time installing a catch purifier for safety in working, as the make approaches the maximum of 1 million cubic feet per 24 hours for each set. [This, however, will not be reached this winter.] This catch box will be common to the two sets of lime boxes, and will be in circuit after the station meter; the small traces of sulphuretted hydrogen which we may occasionally get—at the outlet of the lime boxes—not being sufficient to justify the putting in of a catch purifier for each set of lime boxes. This arrangement enables us to maintain our system of a meter for each complete set of purifying boxes, without putting in two catch boxes.

The following is our method of working the purifiers at St. Helens. When the gas, tested at the outlet of the third purifier in the series of four boxes, shows traces of sulphuretted hydrogen, the first purifier in that series is shut off, emptied, refilled with lime, and put on last (or fourth box) in the series. By this means, our impurities are kept down to the figures given hereafter.

Tests for Impurities, Average of Tests over the Last Five Years.

Sulphur, Grains per 100 Cubic Feet of Gas.

Year ending March 31.	Average Maximum.	Average Minimum.	Average Mean.
,, 1906 .	9·5 ..	8·1 ..	8·8
,, 1905 .	10·2 ..	9·2 ..	9·7
,, 1904 .	10·1 ..	8·4 ..	9·23
,, 1903 .	9·4 ..	8·3 ..	8·8
,, 1902 .	9·05 ..	7·92 ..	8·4
			8·98

Carbonic Acid, no trace.

The author, in carrying out this practice of thorough purification, does so by arrangement with his Committee, although under no legal obligation to do so. He holds the opinion that there is much which can be said in favour of the arguments for such thorough purification; as he agrees with those who say that we should strive to turn out a gas having the largest percentage possible of combustible matter in its composition, and that both flame temperature and calorific value are to be taken into consideration in these days in valuing a gas as well as illuminating power and price per 1000 cubic feet.

Of course, the ideal gas for internal illumination would contain no sulphur compounds. We have not quite arrived at this condition, although the author holds that the extent of the reduction which can be made by the right use of lime goes a long way to justify its continued use where possible.

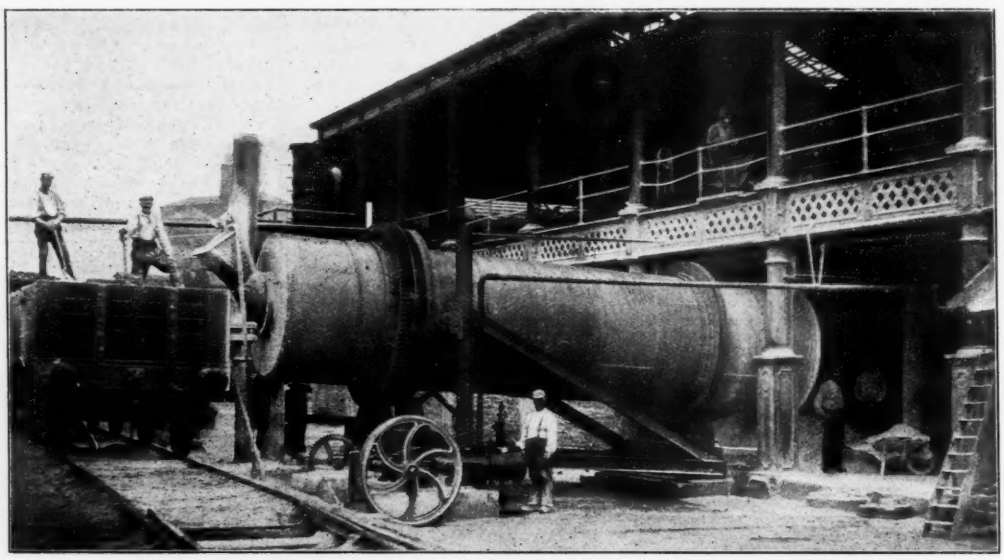
The cost of purification per 1000 cubic feet of gas purified was (on the average of the last five years) 0·512d., which figure is within the one-thousandth of a penny of being as low as the average of all the figures giving the costs of purification that are published in last year's issue of the "Gas World Analysis of Accounts." The number of purifiers changed last year was 88. The average quantity of gas per change of purifier (average for the last five years) was 4,541,398 cubic feet. The total weight of lime used last year was 1722 tons. The average weight of lime used per box was 19·5 tons. The total weight of waste lime obtained during last year was 3226 tons. The average weight of waste lime per box was 36·6 tons.

To carry out the purification in accordance with the arrangement described, we require at the present time to deal with about 1800 tons of lime per annum. Our floor space being limited, the handling of the material in the ordinary way—wheeling it in from the waggons and then slaking it in heaps on the floor, afterwards turning it over two or three times to get it properly mixed and in the right condition—became a burdensome and disagreeable job,

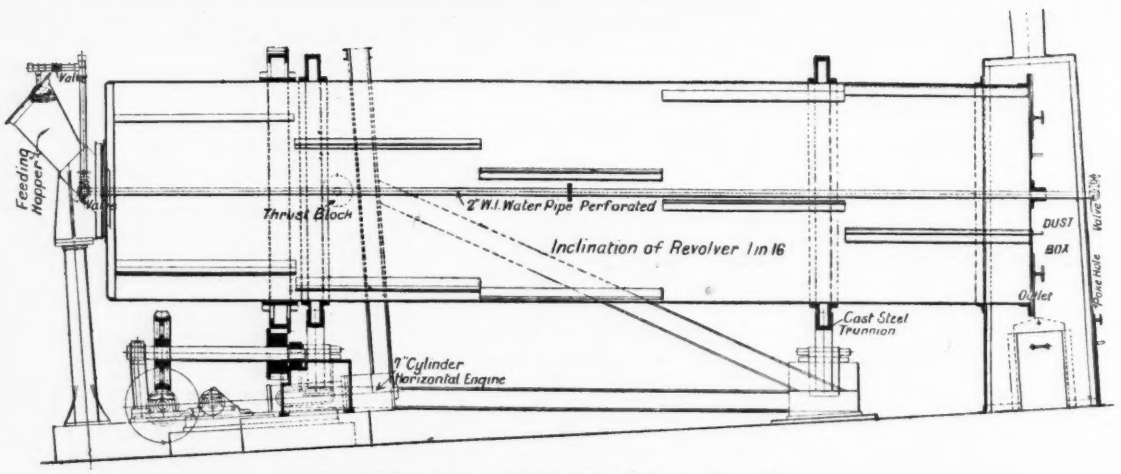
both for the men and the management; and having heard of a lime-preparing apparatus which is used in one of our local chemical works (the patented invention of Dr. Best, and owned by him and the United Alkali Company), the author examined same with a view to seeing if it would be of any service for his purpose. The author was so attracted by the idea that he obtained the permission of the owners to apply their patent to his special requirements in a modified form of their apparatus; and having explained the scheme to his Committee, he was authorized to proceed with the erection of the apparatus, on the lines indicated, and which is represented on the diagram.

The apparatus consists essentially of a long cylinder, placed at an angle, and arranged to rotate slowly. While rotating, the lime is fed in at the high end; and at the entrance, and during its passage down the revolver, water is mixed with the lime, by means of suitable spray pipes, with the result that the lime is delivered at the low end of the revolving cylinder slaked and ready for use. The degree of moisture in the lime is regulated by means of suitable valves, and by adjusting the speed of the revolving cylinder until the lime is delivered in the required condition.

Revolving Cylinder.—Referring to the drawings, it will be seen that the revolver consists of a steel cylinder, 7 feet in diameter and 30 feet long, with closed ends, and made of plates $\frac{1}{2}$ inch thick. In the high end, a circular opening is made to receive the feed pipe. In the low end, there are four rectangular openings 18 in. by 12 in., each provided with a sliding door, with a screw for securing it in any desired position, so that the amount of opening can be altered to regulate the delivery of the slaked lime. In order to make the mixture of the lime and water as intimate as possible, angles are riveted to the inside of the cylinder in short lengths, stepped so as to roughly approximate spirals. By this means, the lime is continually being turned over, and thus fresh surfaces are presented to be acted upon by the water.



Best's Patent Lime-Preparing Apparatus.



Longitudinal Section of Best's Lime-Preparing Apparatus.

Bearing Rings.—Upon the outside of the cylinder there are two of Cook's patent cast-steel bearing rings riveted. These rings rest upon cast-steel carrying wheels, which run in suitable bearings carried by strong cast-iron bedplates. The amount of inclination given to the revolving cylinder is regulated by the relative height of the two bedplates, so that the revolving cylinder may be placed at any desired angle. For the purposes of this apparatus, the inclination adopted is 1 in 16.

Gearing.—The cylinder is rotated by means of spur-and-worm gearing driven by a steam-engine or other suitable motor. Upon the cylinder there is secured, by keys and bolts, a strong cast-iron spur wheel, fixed close to the bearing ring at the high end. Into this wheel there is geared a cast-iron spur pinion keyed on a steel shaft; and on the other end of this shaft there is keyed a cast-iron worm wheel, which is driven by a suitable worm running in an oil trough. The pinion shaft is carried at one end by a pedestal fixed to the bedplate, and at the other end by a pedestal and stand attached to the plate carrying the worm and its shaft. The worm shaft is carried in suitable bearings, and there is special provision to take up the thrust of the worm. The worm shaft is coupled to the engine shaft by suitable spur gearing. The spur pinion on the engine shaft is fitted with disengaging gear, so that the apparatus may be stopped without stopping the engine, or the engine started without the load on. The engine in this instance has an 8-inch steam cylinder, with 10-inch stroke.

Thrust Bearings.—In order to prevent the revolving cylinder running off the carrying wheels when placed at an angle, special arrangements are made to resist the tendency to slide. These consist of two cast-steel thrust rollers, which bear hard against the side of the bearing ring on the high end—one on each side of the revolving cylinder—and are carried on a rigid framework built up of rolled steel joists and connected to the bedplate at the low end. The thrust due to inclination is thus taken up and transferred to the foundations. The low-side bearings of the carrying wheels and of the worm-wheel shaft under the revolving cylinder are also provided with adjustable thrust pads arranged to resist the tendency of these parts (which are also placed at an inclination) to slide. The feed hopper is made of steel and cast iron; the

lower portion being round, and carried into the revolving cylinder. The hopper is carried on a suitable pillar built into the foundations. In order to prevent the dust and steam flying about and becoming a nuisance at the delivery end, a dust-box with sliding doors can be placed (made of steel plates and angles, with suitable openings at the front and sides), into which the slaked lime is delivered.

The slaked lime is then removed through the door openings, or, if preferred, there may be fixed in the bottom of the dust-box a worm creeper and elevator, to carry the slaked lime to where it can be stored until required. The steam generated during the process escapes through this dust-box and passes away up a ventilating pipe. Baffle-plates are arranged inside the dust-box to catch as much of the dust as possible. The apparatus has proved to be suitable for dealing with all classes of lime, as we have tried lump lime of various qualities, although we generally use small lime, which is very difficult to slake in the ordinary way, but which the apparatus under consideration handles in a most efficient manner. For any manufacturing purposes where slaked lime in the form of powder is used, or where it is required to be sieved, the apparatus as originally designed and worked is very successful. For his purpose, the author finds that the economy brought about by its use is such that the apparatus (which cost between £600 and £700) will be paid for in a few years.

In practice, it has proved to be a wholesale method of dealing in detail with all the lime required—preparing it in the shortest possible time from being raw lime in the waggon to being slaked lime conveyed and deposited upon the floor of the lime store. The revolver being 30 feet long, it is not necessary to keep the lime any longer in the revolver than is necessary for it to make its journey through; and the men can commence operations—three men in a waggon, two always working and one relieving them alternately—and in half-an-hour slaked lime will be being delivered on the floor as fast as three men can remove it. The cylinder does not need to be emptied at the end of each batch. The water can be shut off, and the engine stopped, as may be required, if the other duties the men have to perform call them away for a time. There is therefore, by the use of this apparatus, a considerable saving of floor space. The area previously occupied by heaps of unslaked or partially slaked lime is now free for the accommodation of lime ready for work, or the floor may be left free so that the other parts of the purifying apparatus are more readily accessible.

Moreover, the apparatus has been proved by experience to overcome, in the simplest possible manner, the most disagreeable portion of our lime preparing operations, as conducted before the adoption of this apparatus. This is testified to by the workmen engaged in this department, who, after a very few lessons, were able to control the operations so completely as to obtain the desired quality of lime. The work, which was previously shrunk from owing to its very disagreeable nature (as well at the slaking as at the waggon end of the series of operations), is now done cheerfully and intelligently, justifying the extra pay which is given in the form of a tonnage rate on the top of ordinary wages, and is afforded by the economies effected, in addition to the saving in net working costs previously stated. This extra pay is very acceptable to the workers, and willingly given by the management, who consider that it is the highest testimony to any improvement if it works successfully, results in economy to those who have spent the money, and at the same time improves the conditions of labour and affords an increase in the workers' pay.

Having found this apparatus for the preparation of lime to be so economical and in every way successful, the author has been led to study the possibilities of a new form of apparatus for use in the process of the revivification of fouled oxide; and the idea seemed so attractive to those gas engineers to whom the author mentioned it, that he has considered it advisable to seek patent protection, in conjunction with another gas engineer who has had considerable experience with the use and preparation of oxides for purification purposes. Upon some future occasion, the author hopes to have a communication to make to the gas engineering profession on this subject, which gets more and more interesting as the use of various mixtures of oxide of iron for purification becomes more extensive, and the monetary value of the sulphur removed by these means from the gas is fully realized, and the demand for nuisances to be avoided during the process of revivification is more fully complied with by the gas producing authorities.

Discussion.

Mr. J. G. Newbigging (Manchester remarked that if Mr. Glover had introduced his paper some fifteen or twenty years ago, it would have been of some use to him; but after all the struggling that had taken place during the last year or two to get out of the use of lime in gas-works, the paper did not appear to him to be of very much value now. The figures Mr. Glover had given were certainly excellent in every way, not only with regard to the amount of impurity which he managed to leave in the gas he distributed, but also the cost. It was needless to say that the latter item could not at all compare with the cost of oxide purification. If this was used in the proper manner, it need not cost anything. In fact, at two of the works of which he had charge, it really cost nothing. As a matter of fact, they made a profit of something like 0·1d. per 1000 cubic feet on the purification items. They not only recovered the sulphur, but also the cyanides, and sold the oxide *plus* the blue. He did not wish to depreciate Mr. Glover's paper in any way, because, as he had already said, the results were most excellent. Some of them considered they were lucky if they could get their sulphur down to 20 grains per 100 cubic feet when they used lime. This was not a paper which lent itself very much to discussion; but he should like to ask Mr. Glover if he found that the lime, after it had been slaked, would travel through the revolver. It appeared to him that it would soon become clogged up from its inclination and the distance the lime had to travel.

Mr. J. C. Belton (Chester) said they were indebted to Mr. Glover for bringing forward the paper, and more particularly because of the hint conveyed by the final sentence—that they might expect in the near future to have a new form of apparatus for dealing with spent oxide. He (Mr. Belton) was very much in the same position as the last speaker, in that he used very little lime; and he thought that they might dispense with it altogether. But their agricultural friends inquired for it from time to time; and if they could not supply them, they might get into bad odour. He had a much smaller area in which to deal with his spent oxide than Mr. Newbigging had, who, he believed, had the advantage of using a horse and plough to turn it over. If any handy apparatus could be introduced for dealing with the oxide inside the works, it would be a great acquisition, and would lead to considerable saving of labour. If Mr. Glover were to carry into effect the idea thrown out at the end of his paper, there would be a great future for his invention; and he (Mr. Belton) hoped to hear more with regard to it later on.

Mr. W. Prince (Stoke-on-Trent) said there were one or two points on which he wished to interrogate Mr. Glover. In the first place, would he give the members some particulars as to the cost of his plant and of dealing with the lime? Secondly, was there any great difficulty in the matter of motive power required? Any figures dealing with this subject would be of great advantage. Mr. Glover was to be congratulated upon his paper, because, if for no other reason, it proved to the world that he was identifying himself with a great commercial product. They were not all striving after big makes of gas, but they should all be striving to make a pure article. It should be the aim of every member to turn out a product free from impurities.

Mr. S. Meunier (Stockport) thought Mr. Glover might with advantage be asked to give a few figures as to the cost of slaking the lime through this particular plant. No doubt he had effected great economies, but it did not follow that they who were differently situated would do so. He was not quite in accord with Mr. Newbigging and Mr. Belton when they said they had no interest in the paper because they had given up lime and were now using oxide. They were far more interested in the alteration of the plant itself to suit their own special purposes. He thought that if there was any process which would enable them to obtain purer gas, it was desirable that all should know it, because, whether or not it carried out their purposes, it affected their business, and it must do good to someone. Therefore he thought they ought, as far as possible, to thresh out the matter, and ask Mr. Glover to give them the figures of the actual cost to himself, so that they might consider them, and see whether, by the adoption of this plant, they might effect some saving on their own account. At the same time, he should like to ask whether the residual products would be made as good as, worse than, or better than they were by the old-fashioned method. The reduction of the sulphur compounds was, of course, a good thing to achieve, if it could be done cheaply. He had had some experience of the adoption of a certain process giving some very remarkable results, which, when he had elaborated them, he hoped to be able to bring before the members. Twenty grains had been spoken of; but he could get less than half that. He had been very much struck to find, during the last few months, that their sulphur compounds had been reduced by a process which had not been intended for this object. In conclusion, he asked Mr. Glover to give them the benefit of his experience with regard to the figures, taking into consideration the interest on the sinking fund on the apparatus itself.

The President (Mr. J. H. Brearley) remarked that, before calling upon Mr. Glover to reply, he should like to say how much they were indebted to him for taking the trouble to bring this matter to their notice—particularly following so soon upon his paper read to the Midland Association on "Tar Distilling." It was rather remarkable that they should have at the same meeting two papers presented, one in defence of lime purification and the other on high-grade gas—both of them being subjects which, in the opinion of most gas engineers, were almost as extinct as the dodo. With regard to a paper of this character, the benefit to be derived from it was naturally what one could obtain by adapting it to his own circumstances. He could picture the outcry that there would be in Longwood and many other districts if lime purification were absolutely resorted to. In his own case, they could produce 450 tons of gas lime per annum; and he ventured to think, considering the amount of sulphur compounds that would still pass forward with the gas and the nuisance that would arise from the lime, the consumers would say: Let us have the sulphur compounds. Perhaps Mr. Glover would tell them how he managed to dispose of his 1800 tons of gas lime per annum, and whether there was any rumpus about it. He thought this was one of the points the London Companies made when they got rid of the sulphur clauses. Mr.

figures for purification were remarkably low. They had heard Mr. Newbigging say he could make a profit on it. In his own case, their purification cost for the last eight years an average of 0·21d. per 1000 cubic feet sold. There was some compensation to the consumers, as Mr. Glover had pointed out in his case, in that they got less of the sulphur compounds; and no doubt the quantity of carbonic acid in the finished gas was less. He should just like to ask Mr. Glover what the calorific value of his gas was in British thermal units net. Coming from the general to the particular, and looking at the useful machine that Mr. Glover had placed before them, it certainly seemed as if it was a machine that would be useful for oxide purification; and if the machine was useful, it would not be because of lime—it would be because of oxide. He was afraid that, if the patentee had to depend upon the royalty he could get from it as a lime mixer, he would soon be relying on the Benevolent Fund which they had been discussing that afternoon. He thought there was room for mechanical ingenuity in oxide purification; and he hoped Mr. Glover would not rest on his oars until he had perfected the machine to which he referred.

Mr. Glover, after thanking the President for his complimentary remarks, said that when called upon by the Secretary to contribute a paper, it had given him great pleasure to fill the gap; but the members must always bear in mind in discussing these things that circumstances altered cases. It would be very foolish, while calling attention to this machine, for him to presume that he was legislating for the world of gas engineers. He merely brought it forward to show what was still being done, and to prove that, notwithstanding it had been said that lime purification was quite extinct, it was still being used. He bore in mind places where lime purification partially was still persisted in, to avoid the nuisance which at present arose from the presence of oxide in purification. In this particular case, by means of the lime all nuisance was avoided; and the difficulties which some of his friends had in the use of oxide were got rid of by the wise and judicious employment of lime in the process of purification. Therefore the lime process was not extinct; and he thought he had no reason to consider the advisability of extinguishing it at St. Helens. He had given his average results for the last five years; and if he had gone back another five years, he did not think the figures would have been altered. He might tell Mr. Newbigging that the figures he quoted applied to a great number of his friends who used oxide, but who evidently did not use it with the great advantage that he had. The impurities that he got at St. Helens were very acceptable to his consumers; and the Committee desired him to continue to turn out gas of this quality. The question of oxide purification had been mentioned; but he did not want to discuss any points that arose on this subject, as they had been pretty well argued recently. He would only say—"For different diseases, different cures." He was somewhat surprised to hear that even 20 grains was considered to be a large result to be obtained from the use of lime, because he found that his results were regularly very much lower than 20 grains. They began to think now that it was high if they got up to as much as 100 grains per 1000 cubic feet. He could relieve Mr. Newbigging's mind on the question of the lime coming through. He put it in his paper that, with two men feeding regularly fresh lime, the outlet where the prepared lime was delivered was such that three men could be kept going wheeling it away. The cost and the time employed he thought were stated in the inclusive figures he had given. Notwithstanding that it involved an increase of wages to the men, and did the work better than it was done before, the cost of doing the work now as compared with formerly was one-half.

Mr. Meunier asked whether that included the interest on the sinking fund.

Mr. Glover said it did. The apparatus would last a long time, and would pay for itself in about seven years. Stating it in this way was much better than giving decimals of a penny. The cost of power was very low indeed; the driving being by a small steam-engine. It was quite true that the apparatus got coated inside; but after a time this would drop off, and if it wanted scraping, a man could quickly get inside and clear off the accumulations. The quality of the product, as he had said, was quite under control by the men themselves. With regard to the disposal of the waste lime, he had no difficulty at all; and if he had any waste lime that his friends could not dispose of, he could sell that too. Outside St. Helens they had a large agricultural population, who were all very glad to fetch the lime away. The only difficulty they had with their lime was that sometimes the yard was more like a horse-show, considering the number of carts that were waiting (many of them waiting from 5 o'clock in the morning) to fetch it away. In conclusion, he would say that the working of the machine had been a very great success; and they had, as he had stated, no difficulty in disposing of the lime.

SOCIETY OF BRITISH GAS INDUSTRIES.

A Meeting of the Society was held on Friday, at the Holborn Restaurant—the President (Mr. Dugald Clerk, M.Inst.C.E., F.C.S.) in the chair. This was the occasion of the annual dinner; and, including visitors, the attendance was somewhere in the neighbourhood of a hundred.

Mr. Charles Clare, as Chairman of the Committee, introduced the President to the members. Mr. Dugald Clerk, he said, was so well known among them that really no personal introduction was necessary. The Council had a great deal of thought before they (if he might use the expression) could "spot" the right man for the position. The man upon whom they set their desire was one who was well-known throughout the industry, one not only possessed of technical and commercial knowledge, but, if possible, one possessed of perennial youth. [Laughter.] And they unanimously came to the conclusion that Mr. Dugald Clerk was their man. They were very gratified by his acceptance of the office. But it was just what they expected, because during Mr. Clerk's thirty years' connection with the industry, his aim had been the same as their own—that was, the welfare and advancement of the gas industry as a whole. The Council believed that, under Mr. Clerk's leadership, the Society would make good progress. They hoped he would be able to look back with feelings of great pleasure upon his presidency.

The President said he thanked the Council exceedingly for electing him to the honourable office of President. It would indeed be a great pleasure to him to do what he could for the Society. Such a Society, in his view, was much wanted. It was a distinct departure from other Societies. They were met together not so much as scientific men and engineers as business men with business objects. Their business objects, however, were of the most legitimate kind; and they all felt, he believed, the necessity of co-operation in business, in order to organize to some extent certain parts of their industry. And they had of late heard a great deal about the importance of organizing industries. There were many useful things that could be performed by organized bodies that could not be performed by individuals alone. He believed in free trade; and a recent visit to America had given him a wholesome fear of trusts. This Society was no ring or trust. Their objects were perfectly legitimate—partly technical, partly scientific, partly business. He did not intend to inflict a speech upon them just then, or to deliver a presidential address. His presidential address would be given in February; and therefore he would now ask Mr. Thomas, a Past-President of the Society of Architects, to give his interesting paper.

Mr. Walter W. Thomas, before reading the paper, said he had himself worked very hard for twenty years in promoting another Society in his profession; and he knew the difficulties the present Society must have had before them in organizing theirs. He was glad to be of some little assistance, and hoped the Society would prosper. By all putting their shoulders to the wheel, it was sure to do so. Mr. Thomas's paper was entitled—

THE USES TO WHICH GAS HAS BEEN, AND CAN BE, PUT WITH ADVANTAGE TO THE PUBLIC AND MANUFACTURERS.

Before delivering what your Secretary terms an address on "The Uses to which Gas has been, and can be, put with Advantage to the Public and Manufacturers," there is a matter I desire to refer to, which, as an architect, may be partly considered as personal to myself. Several of the members of your Society have complained that the gentlemen of my profession are loth to give facilities to those in your industry who desire to introduce improvements in method or in style, while, on the other hand, they are always ready to listen to anything which may be put before them by your friends the electricians.

In answer to this, I should like to ask you to reply candidly as to whether this is altogether the fault of the architects. In the past, when gas companies considered that their position was unassailable, they acted as though the people were made for them, and not they for the people. They were the most unapproachable people in the land. If you wanted information in connection with gas matters, you could only obtain it with the greatest difficulty, and frequently received a snubbing in the process. There were, as there always are, notable exceptions to the rule. When you required to have gas connected, if you were at all what the manager considered too inquisitive, you were told that you could take the gas or leave it.

You will say that I am going back to ancient days; but, in reply, I have to say that the feeling then engendered has to be cleared away. When therefore I received an invitation to appear before your Society—an invitation due to my official capacity as ex-President to the Society of Architects—I accepted it as showing that something was going to be done by you with a view to bringing about this clearing of the air; and I felt that for architects and gas men to rub together would be advantageous.

As regards the electricians, they have never hidden their light under a bushel. The gas men, however, had been spoiled by success; and it was a fortunate matter both for them and for their clients that the electric light came just at the most opportune moment—just at a time when it was most needed to spur up the administrative departments of the large gas undertakings of this country. I do not for one moment intend to suggest that the apathy that existed for so many years in your industry was due to want of initiative among your engineers, or among your managers. It was due to the financial magnates—to the administrative

departments. They saw, or rather thought they saw, that their dividends were assured, and cared little for anything other than that. However, on the introduction of the electric light, these particular gentlemen took fright. There was a great fall in the values of your securities; and the sound, strong men of your profession were then asked to come to the front, and see what could be done to save the situation. Shortly after this time, the Welsbach light was introduced. Now this light has been your salvation. It has proved so—at any rate, for street lighting, it is far and away better than any competing system of lighting.

Now, as regards the interior lighting of public buildings, of houses and hotels, and of shops in particular, there are few cases where the electric light shows to advantage in comparison with the Welsbach burner. But there are many advances that you have yet to make before you can hope to oust that light for domestic purposes. Such a Society as this might well ask the section that belongs to what may be termed the illuminating portion of the gas industry, to lay out a standard of rules for the lighting of these buildings. They might specify the number and candle power of lamps required for various sizes of rooms; they might, with advantage, point out how these lights can be fixed so as to give the maximum of efficiency in lighting, while at the same time assisting in the ventilating. It would be well also that you point out in any scheme that you may draw out, the different amount of candle power required for the illumination of rooms having sombre decoration, and those having a more light type of decoration.

I am aware that the lighting engineer must particularly give his attention to the question of economy. On the other hand, architects may be said to be in many instances more practically interested in the æsthetic or decorative. Now, if these problems were to be considered jointly by Architectural Societies and by Gas Engineering Societies, it would certainly be of great advantage to all.

One matter that is deserving of immediate attention is that of the fittings requisite for use with incandescent lights. In many cases, lights of great brilliancy are fixed in the field of sight, and thus cause grave apprehension to those who are interested from a physiological point of view, as regards injury that might accrue to the eyesight. This fear would be removed if the light sources were screened, and the illuminating power more particularly derived from reflection. From an economical standpoint, the correct disposition of light sources and the use of good reflectors are matters of vital importance. Of late years gas companies have given much more attention to this subject. Their ultimate advantage must be in making the very best display possible at the very least cost.

The progress of invention during late years, more particularly in lighting, has been such that I have no doubt you yourselves have found some difficulty in keeping alive to it. Then how much more so is it the case with architects, with whom the question of lighting is only one of a multitude of serious questions that have to be considered in regard to the buildings upon which they are engaged? Now, if information on this subject was annually got into form by your Society, and made accessible—not only to yourselves, but also to architects and to others interested in your Society—you would be doing a very good work, and would, at the same time, be pushing forward the advantages of your industry.

I have been very much pleased with many of the inverted types of incandescent gas-lamps; but at the same time there are many drawbacks in connection with them. There are not, as yet, fittings entirely suitable for use with them. The heat from the mantle most probably tarnishes and damages brass or lacquer work. These are all matters for future consideration.

Now gas companies must certainly have suffered very severely from the great reduction in consumption that takes place where incandescent gas-lamps are generally introduced. From my own experience, I know that many burners have been changed from the ordinary flat-flame to the incandescent, and that the consumption of gas in the buildings has thereby been, on an average, reduced over 30 per cent. I do not know whether gas authorities have gone into this matter; but I should imagine that this will be somewhere near the general reduction caused by the introduction of this new burner—the light given being also materially better than that hitherto supplied.

Now as regards your industry, there is another side which is of more general interest than even that of lighting—that is, the applicability of gas for the purposes of obtaining power, and for displacing the use of solid fuel. There is no body of men more interested in obtaining a clear atmosphere than the architects. We find that our masterpieces, when erected in our cities, are very shortly veiled by the products of imperfect combustion, and their prominent features ruined by acid fumes. It is for you, gentlemen, to show us how all this can be changed, so that the face of Art and Nature shall again shine forth in pristine clearness. You have done much in the direction of reducing the smoke nuisance, by your introduction of gas-engines; you have still further added to the indebtedness of the public by your introduction of gas-cooking appliances; and I consider it is mainly due to these two features of your business that, during the last two years, our skies in the summer have been practically clear. There is not a shadow of doubt that the great bulk of the smoke of our cities is due to domestic fires. It is an impossibility to burn, as people do, sixty million tons of coal annually in their domestic fires, without care, without attention, and without coal-saving devices, and not at the same time foul the atmosphere, and poison their neighbours. This is conclusively shown by the fact that in districts where factory chimneys are few and far between (residential districts) the fog-cloud regularly appears; and it appears at the time when the days become chilly, and heat is required for our offices and for our houses. It is here that you have before you a practically untouched series of possibilities.

In my own office, I have discarded all coal; and as a result I have cleanliness and an absence of dust and dirt seldom found in offices, however well attended to by the office-keeper. I use a gas-boiler, and have circulating hot-water pipes so arranged that I get an equal temperature throughout the winter. I flatter myself that, while I am so doing, I am not damaging the interests of my neighbours. Why are these appliances not more generally used? I feel sure it is only necessary to show local authorities that it is possible to obtain power and heat without emission of black smoke, to enable you to get enactments absolutely forbidding the emission of smoke. Is it not worth the while of gas companies to supply the fuel to them, and could they not well afford to make a reduction in price in cases where gas-boilers, gas-fires, and general heating apparatus are put in use?

In asking this, the users and intended users are, I consider, well within their rights. The present capital of gas undertakings of this country, per million feet of gas made, might be reduced by at least one-third of the amount by catering for a constant, regular load, such as that which would be obtained from supplying these new fields. I know that this would create an immense boom in the use of gas—such a one as they have never had since the introduction of the coin-freed meter. It is only necessary that a few men such as those who were originally identified with the "penny-in-the-slot" meter, should put their shoulders to the wheel.

In mentioning this, I feel that, as an architect—one of those gentlemen who were not supposed to be too anxious to assist the gas profession—I am speaking from personal experience, and am partly removing the stigma of want of interest in the gas profession. I joined the original Syndicate that owned the first patents in the slot-meter. I refer to those of Brownhill, of Marsh, and of Thorp; and I shall ever remember the strenuous efforts that it required, the industry, the indefatigable determination of our Manager (Mr. Marsh), backed up by the money and time of myself and my fellow-Directors, to enable the vast industry that was then created to be formed. I shall always take credit in this matter. When my own city adopted them, and when Sir George Livesey gave them the weight of his great influence and power, the business was made, and has never looked behind it. I do not think that I should be at all over-stretching the mark if I said that this industry has created work for at least 100,000 hands in Europe alone. You have there an example of what you have done. In the United Kingdom alone, there are now in use 1,920,161 of these slot-meters. I would impress upon you that you ought to have as many gas-fires fixed as you have got slot-meters; and it only requires the same type of men to bring this about.

When you cater for this particular trade of heating, it will be well to remember that you are making every customer burn double or even three times the amount that he is doing to-day; that you are not having to put down miles of new mains; you are not having to search for new districts to supply; you are not having to ask Parliament to grant concessions for breaking-up roads; you are simply making your own customers more fruitful. In addressing this Society, I know I am addressing a new Society of men. I know that your industry has other Institutes; but these have their time fully occupied in the consideration of the very many technical points which gas men have to consider. I know that these Technical Societies have to consider the best means of carbonizing, the most improved methods of purification, the easiest methods of transport, and the general organizing of gas-works. They have to consider how best to work off their bye-products, and have so many subjects practically within the gas-works, that it is actually a surprise and a wonder that these men, who have taken prominent positions in these Societies, have had the time to devote attention at all to outside subjects.

Yet seeing that gas companies represent a capital of not less than one hundred and seventy-nine million pounds sterling, taking their market value—without considering the subsidiary branches of business which you, gentlemen, represent, and in which also there is invested very large sums of money—it shows how necessary it is that there should be a Society such as this whose objects I am informed are, first and foremost, to impress sanitary and local authorities with the necessity of utilizing their gas in many new fields, and in making its introduction for new purposes—domestic as well as commercial—their constant study. What I advise this Society to do is to get into communication with all other Societies having similar ends in view, and that you should jointly and separately agitate and never be content until you compel sanitary authorities to restrict and prohibit the emission of smoke from domestic houses, with the same rigidity that they now exert towards the suppression of smoke from factories and works. Why should a householder, because he is not engaged in an industry, be allowed to poison his neighbours, when the owner of premises employing labour is subject to constant conflict with the authorities?

The gas industry, gentlemen, is perhaps—after the transport and railway undertakings—the largest in the country, as regards capital investments, and you certainly have done more than any

other industry to bring civilization and light into the various corners of our country. I estimate roughly that there is a capital investment of certainly not less than two hundred million pounds sterling—that is, including the subsidiary businesses; and, as I have said before, I believe the output could be trebled with an expenditure of less than one-third of this amount. I hope that you will be great factors in the future, not only in clearing our air from impurities, but in gathering together these impurities and supplying them to our agriculturists, so that they may enrich and fertilize our country, and that good may thus come out of evil.

I will not longer trespass upon your time than it takes me to say that I am satisfied that in the near future the work of the furnaces of this country, of the steam-boilers, and the general heating, will be accomplished by products supplied by yourselves.

Mr. Dugald Clerk on Cheap Gas.

The President, in proposing a vote of thanks to Mr. Thomas for his paper, said there were many little points in which his experience had been different from that of the author. So far as his friends the managers of gas-works were concerned, his relations with them had been of the pleasantest. He had always found that everyone in connection with gas-works, whether high in command or low, had a lively interest in his particular subject of the gas-engine; and he had had every possible assistance from gas managers that one could possibly ask for. In fact, so far as the gas-engine industry was concerned, it owned its birth entirely to the coal-gas industry of this and other countries. They had, however, gone beyond coal gas in some ways for the larger powers. It must be obvious to all gas managers that cheap gas should be their end and aim; and that the cheaper the gas, the more prosperous would be the industry of gas manufacture and the allied industries—the supply of plant, engines, stoves, meters, and all the manufactures subsidiary to gas production. He was sure that many of their gas-works managers and many of their large gas companies, both London and Provincial, had very much at heart the introduction of cheaper and cheaper gas. In the last year or two, there had been a tangible reduction in price going on all over the country. He hoped with Mr. Thomas that it would go farther—so far that, as he suggested, all the smoke of towns would be abolished by the use of gas-stoves. To that end, he (the President) was sure the members of the Society of British Gas Industries would be delighted to co-operate with architects in arranging suitable devices for ventilating in connection with the use of gas and gas-stoves. They were all servants of the public, and could only prosper by serving the public well. They must therefore look into every matter, whether or not it appeared quite convenient, to see that present appliances were the best possible. They might find some defects; and they should do all they could to remedy them—they should work in conjunction with the Institution of Gas Engineers and the Architectural Societies to remedy all defects if any existed. The greatly increased use of gas would, it might be expected, expedite the modifications that he had no doubt the members had in mind. With regard to the application of gas to power, of course that was a very large branch of the gas industry. So far as he understood, about 15 or 20 per cent. of the gas manufactured in Great Britain was used in gas-engines; and he was greatly hoping that, if the price came down to something between 1s. and 1s. 6d. per 1000 cubic feet for gas of (say) 600 B.Th.U., the percentage of gas so used would be largely increased. He thought it was very desirable they should put their shoulders to the wheel in this way, because, in view of the competition with electric light and electric power, it was essential for them to look carefully to find where they had the greatest possible advantages. There was no doubt there would always be a sphere for electric power and light. He did not think any of them hoped to absolutely abolish electric lighting. If they did, they might hope in vain, because they would not succeed. They had better far address themselves to something reasonable, to increase the demand for, and increase the supply of, gas and the necessary apparatus and appliances. They knew they could beat both electric light and electric power; but in many places people would use electric light, and in many places they would use electric power. He did not grumble. It was a free country; and competition was good for them. The gas industry indeed had greatly benefited by the electric light. He did not know whether Baron Auer von Welsbach, when he invented the incandescent mantle, had in his mind the competition of electricity. Whatever he had in mind, he developed the most interesting appliances, from a scientific point of view, for enormously increasing the amount of light to be obtained from a given quantity of gas. He (the President) was concerned in a good deal of the litigation years ago in the Law Courts for Welsbach; and he remembered how, on testing very carefully in his laboratory in London many different types of Welsbach burners, he had found the great economy of which Mr. Thomas had spoken. The amount of light obtained with some of the later forms of incandescent lamps, with slight regeneration, rose as high as 30 candles per cubic foot of gas burned; and 20 candles per foot was about the average result of transforming gas into light in the ordinary Welsbach burner. The consequence was that, although Mr. Thomas mentioned a reduction of about 30 per cent. in the amount of gas consumed as the result of using the incandescent burner, the amount of light realized was enormously increased. But the fact that the Welsbach burner had come, had tended to make people desire not only to save money, but to get more and more light; and a very important point, apart from cost, lay in this: That for a given cubical capacity of room, they had a certain amount of oxygen. They burned up this oxygen too freely in the days of the old flat-flame burner; and one remembered vividly how quickly a room was then heated, and how much was obtained in the way of products of combustion. In using the Welsbach light, however, such a small quantity of gas was burned, that the carbonic acid in a room did not rise appreciably. So from that point of view, the Welsbach burner had helped Mr. Thomas's point, because it did not require the great amount of ventilation that the older system of illumination would have wanted. They could not imagine anything better than incandescent gas-burners; and so long as they were kept in good order—and they were easily kept in good order—they had in them a considerable source of illumination. The introduction of the gas-engine had, of course, been a subject of very extensive interest, and it was going to be not only interesting on land but it promised to be interesting on sea. The gas-engine, or rather its developments, they owed originally to the gas industry—not that the gas industry furnished the inventors; outside engineers were the inventors. But no success could have been achieved but for a flourishing coal-gas industry. For example as early as 1838, there was a compression gas-engine proposed; and he believed it was built by an Englishman. In it, the cycle followed was much the same as the present cycle. But these things could not come into use until the gas industry had been thoroughly established. Accordingly they could claim for themselves this great modern development. Some people thought that, while the Nineteenth Century was the century of steam, the Twentieth Century was that of the internal combustion motor, though perhaps this was a little exaggerated. They were all exceedingly obliged to Mr. Thomas for his suggestive address.

Price of Gas and Municipal Management.

Mr. T. G. Marsh, in seconding the motion, remarked that, until he heard this paper read, he had always thought the products of gas manufacture were well looked after. Sir William Perkins showed a number of years ago what could be done with tar; and since then, they had been shown what could be done with sulphate of ammonia, into which gas engineers and managers had gone with vigour. And to-day the backbone of the industry was what were the residual products, and gas was coming to the time when it would be the residual product. When this time did come, they would have to sell the gas at a much cheaper price than it was sold at now, and they could afford to do it. What Mr. Thomas had pictured of the old-time gas people—he did not say the gas managers of to-day—he (Mr. Marsh) believed these present would agree was correct. There were still clogs in the wheel; and those clogs were the financial and administrative departments. Particularly was this the case with municipalities. When a municipality got hold of the gas profits, their great desire was to do what they could to relieve the rates—not the ratepayers by any means. They took it out of one pocket, and put it into another. A correspondent in the "Manchester Guardian" recently called attention to this matter. In Manchester, they took a profit from the gas consumers of £30,000 in aid of the rates, after allowing for depreciation and sinking fund; and what did it cost them? They had actually to hand over to the income-tax people a sum of £3000 for the great privilege of putting their hand into one pocket and changing its contents to another. Could there be anything more absurd? Mr. Marsh went on to remark upon the clearness of the atmosphere in Manchester in the summer months when gas cooking was the vogue, and then directly there was a cold snap, and house fires, using solid fuel, were lit up, then the sooty state of the atmosphere recommenced. This was also a point in the "Manchester Guardian" correspondence. People, however, were not to blame for this condition of things in towns where gas was put up to artificial prices. The time had come when smoke should be utterly abolished; and this could be done by the use of cheap gas as fuel. He was determined, in spite of municipalities, to lecture on this smoke nuisance everywhere; and gas companies would have to help him whole-heartedly. The amount of gas that should be sold for heating should certainly be three times as much as was sold for lighting. What was wanted were progressive administrators in the gas industry to work with the progressive engineers; and then the gas industry would be more successful than it ever had been.

The motion was unanimously carried; and Mr. Thomas made a brief reply.

The February Meeting.

Mr. Clare said this was the general autumn meeting of the Society. There were certain other items on the *agenda* which would be postponed. There were the questions of the rules and bye-laws, associate members, and the subject of exhibitions to be considered. He might say they had received a telegram from the Committee of the Manchester Institution of Gas Engineers, asking for the support of the Society for their exhibition in October, 1907. That would receive the best attention of the Society. He also had to give notice that, at the general meeting in February, the Presidential Address would be delivered by Mr. Dugald Clerk. It would be on the subject of "Some Possible Improvements in the Patent Law." This would be followed by a short exposition, by Mr. C. E. Brackenbury, of the new Act against bribery and corruption.

THE FIRST ANNUAL DINNER.

Shortly after the business meeting, there was a reception by the President of the members and their guests; and it was followed by the first annual dinner. Mr. Dugald Clerk presided, and on his right hand side was the President of the Institution of Gas Engineers (Mr. Charles Hunt), and at the right hand side of the Chairman of the Society (Mr. Charles Clare) was the Hon. Secretary of the Institution (Mr. James W. Helps). So far as opportunity allowed, Presidents and Secretaries of the District Associations of the gas profession were present; and the profession of architecture was also in evidence. Metropolitan, suburban, and provincial gas supply was likewise represented by some well-known engineers and managers. To say the least, it was a remarkable gathering; and every conceivable branch of the gas industry was (so to speak) there in the persons of gentlemen actively engaged in the divers pursuits and operations which go to make up its great entirety.

The dinner and subsequent proceedings were a brilliant success. After the toasts of the King and the Royal Family had been gracefully put by the President, and honoured with generous loyalty by those present,

Mr. W. W. Thomas (the reader of the paper at the afternoon meeting) submitted "The Society of British Gas Industries." He heartily complimented the members upon the gathering, and remarked that the President ought to feel very proud to have about him such a number of gentlemen of high intelligence and ability. He expressed the hope that the Society would grow larger and larger every year, and that the members would, among their other duties, show the architects of the country how they could help them. He was sure the Architectural Society that he himself represented would do all they could, if the British gas industries would direct the way, to aid them in making proper provision for the utilization of gas. He trusted the Society would flourish both in quality and numbers for many years to come.

Friendship in Rivalry.

The President, in responding on behalf of the Society, said he thanked Mr. Thomas and the visitors from the bottom of his heart for their good wishes. He indeed hoped that the Society would have a long and useful career. It was true that it differed to some extent from other societies to which he (Mr. Dugald Clerk) had the honour to belong, in that it was not entirely a scientific society, nor wholly technical. It was a society of business men, many of whom had also scientific and technical qualifications. The Society rather represented the business side of the gas industry. They were always being told that in England they did things in a muddling sort of way. But, somehow or other, they always seemed to get through. It might be they had something to learn about organization; and the aim of their Society was to attempt to organize, in a businesslike and thoroughly honourable way, those of its members who were engaged in the industry of supplying gas-works with their requirements. He did not know whether he himself came under this designation. He noticed in their list of sections that a gas-engine section was omitted, although the members had chosen a gas-engine man as their President. The President of the Society, however, had not much power. He was more of a figurehead than anything else. The real working power rested with the Chairman and the Sectional Committees. But although the President was not allowed to interfere with the discussions of the sectional bodies, he was allowed a certain supervision, and to see that everything was going well. In this, he thought the Society had done right. He was happy to accept the presidency of the Society, although he was a scientific man rather than a business man. Still those of them who were not born with silver spoons in their mouths had to mix a little business with their scientific work. They had to uphold and to fight for the particular industry with which they were associated; and though they had to uphold and fight for the industry, they had also to fight in one sense with each other. For the members of the gas-engine industry, he might say —and his friend Mr. H. N. Pickerton, of the National Gas-Engine Company, could endorse this—that they each and all entertained the most friendly feelings for their rivals. And it was a good thing for them all, whatever their business, to know that their rivals were not such a bad lot of fellows after all. That was one of the good things that such an organization as this produced. It was intended to keep a sharp look-out to see that everything was done honourably and straightforwardly. There were black sheep in every flock; and they wanted to keep out the black sheep if they could.

Friends and Allies.

Mr. Charles Clare, in proposing the "Visitors," remarked that, if the Society formed a common platform on which both sides could meet together, and discuss affairs of common importance to the commercial side of the industry, the Society would not have been formed in vain. They had heard of the various uses to which the Society could be put. There was one which had not been mentioned, but which the Council considered an important one—that was, to ensure as far as possible that good fellowship should exist not only between the members of the Society, but between the Society and those with whom the members had to deal. It was therefore with great pleasure that they received their visitors there that night; and the members thanked them very much indeed for coming—some of them from considerable distances. The members indeed took it as a great compliment, because it would appear to show that their visitors were interesting themselves in what the Society were doing. That was what they wanted. It was only a few months ago that one of the largest gas companies, in addressing certain contractors, alluded to them as "friends and allies;" and he could not conceive any happier phrase than that in which to express the relationship that this Society wished to have with all the gas organizations of the country. He associated with the toast the names of Mr. Charles Hunt and Mr. Samuel Cutler, jun.

On Common Ground—Where Improvement is Needed.

Mr. Charles Hunt said he felt it a great privilege to respond to the toast, as he understood he had been called upon in consequence of his connection with the Institution of Gas Engineers. He need not assure the members that it had given him and his friends and colleagues very great pleasure to be present; and he most cordially reciprocated the terms in which Mr. Clare had alluded to them in relation to the Society. There was between the Institution of Gas Engineers and the Society a very intimate connection. They stood, as it were, on common ground. The industries represented by the members of the Society existed and flourished by reason of the continuous growth of gas consumption; and it was not less true to say that the gas supply industry owed the prosperity that had attended it in the past and its present prosperity, in no small degree, to the energy and ability with which the allied industries had been carried on. Might it not be said that the gas industry called these allied industries into being; and had in its turn been nourished and strengthened by them? They owed a great deal to the way in which these industries had been carried on in the past. They hoped to owe still more to them in the future; for there never was a time more than the present in which the co-operation of these allied industries was required by the gas industry, having regard to the keen competition to which gas was now subjected, and also to the many additional uses to which gas was now applied. Formerly the gas manager confined his attention very largely to the manufacture of gas. But here he (Mr. Hunt) must enter a protest in regard to what had been said by the author of the paper read to them that afternoon, as to the unwillingness of gas managers to increase the consumption of gas. He could speak with an experience of nearly fifty years of gas supply; and he could say with confidence that at no time during that period had the statement been true generally of gas undertakings. Mr. Thomas's experience had been somewhat unfortunate. However, he had said that the gas supply industry asked, and it would, he was sure, not ask in vain, for the co-operation of the allied industries in the future. In this connection, he should like to refer to the conspicuous services their President had rendered in the development and perfecting of the gas-engine, than which the gas industry had had no more important ally during recent years. He ventured to say the name of Dugald Clerk would always be held in honour in connection with one of the most striking departures of the Nineteenth Century—namely, the substitution for steam of the internal combustion engine. Some of them might be disposed to look rather askance at the favour with which gas-engine makers regarded the rival claims of various forms of producer gas; but, on the whole they were inclined to look upon that as a kind of flirtation. At all events they indulged the hope that the old love would prove in attractiveness the most enduring. There were many directions in which the industries represented by the Society could assist gas undertakings. They had been lectured that afternoon by their friend Mr. Marsh on the iniquities of municipalities, and on the iniquities of gas undertakings generally, in not selling gas cheaper. If Mr. Marsh had had a little experience in gas management, he would have found out that reductions in the price of gas were not so easy as he imagined. He (Mr. Hunt) quite admitted that if the Corporation of Manchester, or other corporations, were to sell at cost price, the price of gas would be lower; but that would not by any means bring about the Millennium. Gas engineers were working in the direction Mr. Marsh indicated; and they were endeavouring year by year to bring down the price of gas, because they were conscious it was absolutely necessary for the continued prosperity of the industry. What they asked for was the co-operation of the members of the Society, because they were the makers of gas apparatus and the means of utilizing gas; and they could help them in a variety of different ways. Much had been said that afternoon about the consumption of gas for heating purposes. This very largely depended upon the manufacture of the apparatus. It was very satisfactory to know that the efficiency of gas-fires had been greatly increased during the last few years; but there was still room for considerable improvement in this respect. It must be recollected that the most efficient heating apparatus for a room was an ordinary or a bunsen burner; and there need be no more apprehension with regard to the products of combustion when gas was used for heating than when used for lighting purposes. They knew that, with regard to the use of gas for lighting purposes, common sense had at length prevailed, and abolition of the sulphur restrictions had become the order of the day. What was now wanted was the application of that same common sense to gas used for heating purposes. There were countries he had just returned from visiting—one where the houses were built without fireplaces or flues. How would they apply gas for heating in such a case? Could

not they take a hint from their friends the oil-stove makers, and adopt their simple methods of warming a room? What they wanted to aim at was simplicity combined with efficiency. It must be remembered that coal gas, when used for heating purposes, must always be considerably more expensive than coal; and this was a great difficulty in the way of its extended use. They could never get the finished product down to the price of the raw material. It was all very well for Mr. Marsh to talk about the time coming when gas would be made for the sake of the residuals. This had been talked of for the last forty or fifty years; and they were as far away from it to-day as ever. He remembered tar being more than 50s. per ton; now it only realized less than half that price. He repeated that gas engineers asked for the co-operation of the Society; and they would always be pleased to meet them and discuss matters of common interest on the most friendly footing.

Standard Clauses for Contracts.

Mr. Samuel Cutler, jun., congratulated the Society most sincerely upon the practical suggestion that emanated from the combined efforts at the Earl's Court Exhibition, and which had resulted in the formation of the Society. He thought the Society had done well in instituting a presidential chair. His experience in connection with the Junior Institution of Engineers was that pleasing results were obtained by an organization being connected with accepted heads and leading men in the professional world. He also recalled with pleasure Mr. Dugald Clerk's presidency of the Junior Institution. Regarding the Society of British Gas Industries, though he was speaking as a visitor that day, he hoped soon to be numbered among the members. He believed that the existence of the Society was fully justified that day, because never in the history of the gas industry had the want of such an organization been felt more than at the present time. The work of the Society must be a large one. They had the iron, steel, coal, and chemical trades closely connected with them; and there were many important subjects that they could discuss, and a great deal of good could be drawn from so doing. It had been suggested that the Society should approach the Institution of Gas Engineers with regard to standard clauses for contracts. He was quite sure gas engineers would welcome a series of equitable standard clauses for insertion in contracts; and he hoped, if the matter did ever come before the Institution of Gas Engineers, that they would give it their very serious attention. There was also the question of labour. A large number of men were employed by the contracting sections of the Society. He was referring to men employed on outside contracts. He thought the Society gave an opportunity for considering the claims of this class of men. They were constantly changing from town to town; and they spent practically the whole of their lives away from the influence of their wives, and the society of their children. If some scheme could be arranged by which these men could be located in different parts of the country, so that they could be regularly employed, and so that there could be an interchangeability about their employment, it would be an excellent thing. Unintentionally, something of this kind of thing, but not to the recognized extent he would wish to see it, was in existence now. The men were frequently changing from firm to firm in accordance with the exigencies of the work in hand and its locality.

The Limitation of Discounts to Consumers.

Mr. James W. Helps was also called upon by the President. In the course of his remarks he said he regarded it as a great honour to have been asked to make a few remarks, and especially to have been invited to the meeting and dinner of the Society. He had from the beginning wished the Society every success; and he would take this opportunity of saying that he believed such an organization was thoroughly required. It was an organization that had to work on the same platform as, though in perhaps somewhat different ways to, the Institution of Gas Engineers; and he felt that, by the combined efforts of the Society and the Institution, continued success could be assured to the industry. It was only by looking to the best manner of utilizing the product of their industry that the success not only of gas undertakings, but of those who were connected with them as contractors, could be best attained. Many remarks had been made that day about selling gas at a cheap rate. There was no gas engineer present who did not feel that. The question, however, of reducing the price of gas was not nearly so easy as people thought; and reducing the price by 1d. or 2d. was not going to make a great deal of difference to the amount of gas that was sold for lighting purposes under present conditions. It was to the manufacturers of appliances that they had now to look to enable the best advantage to be obtained out of the gas that was consumed, and more good would be done in this way than by reducing the price by 1d. or 2d. per 1000 cubic feet all round. He did not know whether there were many gas companies who had clauses in their Acts to prevent them, for large or power consumptions, reducing below a certain point. They had such a clause in the Act obtained by the Croydon Company last year. They were limited to 20 per cent. discount. Therefore, supposing they allowed this discount to one consumer using 100,000 cubic feet, that was all they could allow to another who used twenty times as much. This limiting clause was inserted in the Act at the instigation of the Local Authority, who were also the suppliers of electricity. They told the Company they had no power to reduce prices, or give discounts, for electricity used for specific purposes. The clause in the Gas Company's Act was, in his opinion, obtained under somewhat unfair conditions; for not only in his own town, but all over the country, electric lighting authorities had reduced the price of electricity to a very great extent; so much so that in some towns they were selling it for power purposes at ¾d. and less per unit. It ought to be pointed out to the Legislature that it was not fair that the gas companies' hands should be tied in the fashion to which he had referred.

Mr. T. G. Marsh, proposing the toast of "The Press," challenged certain of the remarks that had been made by Mr. Hunt and Mr. Helps.

The remaining toast was "The President," and Mr. Fred. J. West, in proposing it, mentioned that the Council felt that Mr. Dugald Clerk's presence at the head of the Society enhanced its prestige and dignity. He also alluded to the article that appeared in the "Journal" on Feb. 13 last, on the "Correlation of Chemistry and Engineering," in which some particulars were given of the early life of the President.

The President made a brief response; and then, with the singing of "Auld Lang Syne," the members and their guests—truly a happy company—separated.

OBITUARY.

The death occurred recently, at his residence, Warham Road Croydon, in his 77th year, of Mr. William Dickinson, a partner in the firm of Messrs. Easton and Anderson. Deceased was one of the Directors of the Falmouth Water Company, Limited, and three years ago succeeded to the Chairmanship.

We regret to record the recent death, in his 71st year, of Mr. James Wadeson, who for many years filled the position of Engineer and Manager of the Windsor Gas Company. The deceased was articled to the late Mr. Upward. After completing his term as pupil, he went to the Dorchester Gas-Works, and shortly afterwards, in 1856, entered the service of the Windsor Gas Company under Mr. Upward, who was then their Engineer. About ten years later this gentleman's connection with the Company ceased, and Mr. Wadeson was appointed Engineer and Manager, which position he occupied until his retirement in 1901. He was a member of the British Association of Gas Managers from 1864, and subsequently of the Gas Institute and the Institution; and he was on the roll of the Southern District Association of Gas Engineers and Managers from the first.

Discussion on Mr. Paterson's Paper at the Southern Meeting.—Towards the end of the remarks by Mr. James W. Helps on Mr. Paterson's paper at the Southern meeting, there is a sentence commencing: "Their exhausters were some distance away from the retort-house," &c. The statement as it appears is obscure, and requires an explanation. It should read: "Their exhausters were some distance away from the retort-house; and the automatic regulator in the exhauster-house was generally worked by a vacuum pipe taken from the outlet end of the condenser, which was close to the exhauster."

Use of Tar on Roads.—M. Le Gavrian has published the results obtained from the tarring of roads (41,000 square metres) in the department of the Seine et Oise; and they were given in a recent number of the "Revue de Chimie Industrielle." The work was executed cold; the tar being made fluid by adding 10 per cent. of heavy tar oil. The mixture poured on the roads was spread by two different gangs of workmen by the aid of brooms, and immediately covered with the previously removed sweepings. The cost per square metre (12·76 square feet) was as follows: Tar, 8·8 c.; sweeping, 5·4 c.; indemnities for workmen, 0·7 c.; and repayment for materials employed, 0·3 c.—total, 15·2 c., or about 1½d. The summer experience was conclusive. Dislocation of the road surface by motor-car traffic was prevented, and there was a great diminution of dust.

Development of Gas-Engines.—In this year's transactions of the Belgian Société de l'Industrie Minérale (Paris District) is a paper by M. Herman Hubert, Professor at the Liége University, on the subject of the "Present Position of Gas-Engines." He gives a short history of the development of gas-engines, and sketches recent improvements which have been made in them, especially as regards the utilization of blast-furnace gases. To give some idea of the great extensions which have been made in this direction, the author cites the work of the five Continental firms of Cockerill, Nuremberg, Deutz, Oechelhaeuser, Körting, and Denain. These have already delivered about 400 engines for use with blast-furnace gases, developing altogether 325,000 H.P., of which amount 126,000 H.P. is for the Nuremberg works, and 100,000 H.P. for the Cockerill works. These figures apply only to the Continent. The author considers that they justify the prophecy that has been made to the effect that the time will come when cast iron will be only a bye-product of blast-furnaces used as a source of motive power.

EXPERIENCES IN COMPETITION FOR POWER.

By GEORGE STEVENSON, of Long Eaton.

[A Paper presented to the Manchester District Institution of Gas Engineers.]

The question of the supply of town gas for power purposes, with special reference to the competition of its most recent competitor—suction gas—has recently occupied the attention of the members of the Lancashire Commercial Section; and, having taken some degree of interest in the supply of gas for power, I gave my local experiences to the members. It was afterwards suggested that I should introduce the matter for discussion at the Institution meeting. After some hesitation, I consented to do so; more to show my appreciation of the value of the Commercial Section, than with the idea of presuming to set forth the technical aspect of the subject. In this connection, I would respectfully direct your attention to the lecture delivered by Mr. Dugald Clerk before the North of England Association in May, 1905. This lecture forms, in my opinion, a splendid epitome of the present position of the power business, and is worthy of very careful reading and attention. Moreover, there is probably no necessity to dwell at length on the construction of suction-gas plants. They are well known to most of the members, and many of us have them actively at work on our own doorsteps, and have been carefully watching their working and progress.

Unquestionably, suction gas is a serious competitor with us, and the whole of the situation will have to be faced. By means of extensive advertising, the suction people state: "10 to 20 B.H.P. for a Penny;" "Cheapest Power on Earth;" "80 per Cent. cheaper than Town Gas," &c.; and I have by me an actual local testimonial stating "that suction gas is 150 per cent. cheaper than town gas at 2s. 2d. per 1000 cubic feet!" So it behoves us to inquire into the truth of the matter. Mr. Dugald Clerk, in the lecture referred to, deals very fully with the whole future of gas-engines; and it will be remembered that he is a strong advocate of low-grade gas—stating that "intrinsic illuminating power is an antiquated superstition." His own idea is that up to 20 H.P. gas, at from 500-600 B.Th.U., at 1s. 6d. per 1000 cubic feet, would be cheaper than suction gas; but over this power he would expect town gas as low as 1s.

Against these claims, we have the statement of such eminent authorities as Mr. Thomas Canning, of Newport, who says that "Coal gas at 2s. 6d. per 1000 feet will easily beat suction gas up 50 B.H.P. without any of the drawbacks attendant upon the latter plant;" and he also adds: "That future progress is more likely to be on our side, if we maintain the rich quality of our gas." Mr. H. E. Jones, of London, says: "If we can bring our gas down below 2s. [he does not say how much below], no producer gas can live."

Long Eaton is a busy manufacturing town, rapidly growing; and during the last few years I have been in keen competition for the equipment of mills for both light and power.

My first experience with suction gas was, I believe, in connection with the second and third plants erected in England. This was in 1903. The owners of the first mill in question, before installing suction gas, offered us 1s. 9d. per 1000 cubic feet; but at that time, the power price being 2s. 5d., we did not see our way to accept the offer, although at the present time we should be very glad of the business. The plant was about 75 H.P., and the cost about £350. Everything went well for a short time; but in the end, we were approached and asked to couple up town gas. Thinking that the suction plant would probably be scrapped, we did so, and therefore had an immediate opportunity of ascertaining the comparative costs of running with our gas, which was, by that time, reduced to 2s. per 1000 feet. Comparing the consumption of each fuel only, it is perhaps needless to say that the direct comparison was entirely against us, especially as labour was not reckoned, as it was argued that the enginemen were required to be constantly about the place, and would have nothing or little else to do had they not the care of the suction plant. After running the plant for two or three weeks on town gas, the plant was got in proper order; and since that time there has been practically no town gas used, and the owners of the mill have installed another plant, which is a better one, about the same size, but at about one-third the cost. This second plant gave every satisfaction; and we were then offered 1s. per 1000 cubic feet, which, of course, we could not accept.

My second experience was with a plant on exactly the same lines. But bearing in mind the difficulties already encountered, the owners wisely put in town gas for emergency purposes, under a guarantee of a minimum consumption. This plant has done fairly well, and very little town gas has been used; but the manager now informs me that, considering the constant trouble, extra labour, and "moral and intellectual" item, he would rather take our gas at the present price. It is only fair to say that this is an old type of plant.

Many gas undertakings have a power business comparatively small in proportion to their total output; and probably these remarks will not be interesting to those members. But in my own case, 12½ per cent. of my output is for power—mostly a twenty-hour load. The business is sufficiently interesting to ensure some efforts being made to retain it, and future business is also attractive, so that I have adopted a scale of charges as follows:

Under	40,000	cubic feet per month,	2s.	1d.	net monthly.
40,000 to	80,000	,, ,,	1	10	,,
80,000 ,,	130,000	,, ,,	1	8	,,
Over	130,000	,, ,,	1	6	,,

Gas for emergency or stand-by purposes is charged at the ordinary rates.

I have had special account forms and print on the back the advantages of town gas. It will be noticed that the lowest price is only for large consumers; and certainly, with the smaller size of engine, even the highest price is relatively cheaper than any form of suction gas, everything being fairly considered. It will also be noticed that the discounts are allowed for net cash monthly, as these low prices do not admit of a quarter's credit being given, and local manufacturers usually pay their coal, &c., accounts every month. During this year, I have submitted schemes for engines, as under: One 60 H.P., 70 H.P.. 75 H.P., 20 H.P., and one 15 H.P., with dynamo and all complete for electric lighting; but with gas at 1s. 6d. per 1000 feet I have found even this price out of the running. I am also acquainted with a scheme for two 100 H.P. engines just outside my district, with town gas offered at 1s. per 1000 feet; and it has been refused. [This is a very special case.]

The statements made by manufacturers with regard to the enormous disparity between town and suction gas really need, however, more qualification. In my own district, I find competition keen with plants of over 50 H.P., where a certain amount of labour is inevitable. Up to this size, I have obtained, and still hope to obtain, further business. We utilize the exhaust gases, for heating "bobbins," &c. In this connection, I would suggest that it is desirable to have one of our fitters specially trained in gas-engine practice, so that we may be in a position to exercise a supervision over the working of the engines, and be ready to give friendly hints and advice where necessary. I have found this policy to be productive of much good. It must be remembered that the comparative cost of fuel alone does not exhaust the costs; and in competition I generally discuss the following points:

1.—Extra capital cost with suction gas of engines for same power; cost of suction plant; foundations; electric ignition; cost of town gas mains, meters, gas bags, &c., or duplicate plant, extra interest and depreciation. — 20 per cent. extra.
2.—Cost of attending to the plant, clinkering, wheeling, ashes, water, oil, &c., &c.
3.—More attention to cleaning piston, valves, &c. Extra cost of repairs, cleaning generators, &c.
4.—Uncertainty of supply.

Enlarging on these points: (1) The extra cost of the engine is quite 15 per cent. in excess of the same power driven by town gas, and there is the extra cost of foundations for plant, and drain costs, &c., and also the cost of providing a duplicate plant, or of coupling up town gas. This is not only necessary for emergency supply; but for the factories in the district, working 20 hours a day, it is necessary that some stand-by should be provided for use when overhauling, repairing, &c. The danger of carbonic oxide poisoning should have some consideration; and in this connection, I may call attention to the recommendations of the Home Office, under the Factory and Workshops Act, 1901. There have already been several fatal cases; and, in my own district, the plant houses have been more specially ventilated, I believe, on this account only. At the same time, I for one do not feel disposed to make so much capital out of this feature (as has apparently been done by some gas companies), as, after all, if there is a sufficient leakage of gas of any description, there is danger to life. The point, however, is worth mentioning.

(2) and (3) The cost of attending to the plant is, in my opinion, more than the makers state. It is a common fallacy to say that "any labourer" can work a suction plant with a few hours tuition, as my experience proves that constant skilled attention and alertness are necessary to ensure anything like good results, and to obviate any nuisance or danger. Sufficient time has not elapsed to make any estimate of the extra wear and tear on the engine and plant; and probably this will not be a very serious item. But something must be reckoned at any rate.

(4) This item will vary according to the value of work depending upon the engine. In one local case, before an emergency supply was available, the owner lost more money in a month than the plant cost; and this experience has been repeated. This is a point for emphasizing the "collateral" advantages of town gas.

The cost to be incurred for fuel for running suction gas is stated to be one pound (1 lb.) of anthracite per B.H.P. per hour. It must, however, be remembered that in every-day working the 1 lb. limit is only attained with good coal, on full load. At half load, the consumption is quite 1¼ lbs., and at quarter load 2 lbs. per B.H.P. per hour. There are many difficulties in suction gas with varying loads. Also the cost of anthracite will be nearer 27s. per ton than 20s., which is the figure usually assumed. With town gas of average quality, at 1s. 6d. per 1000 cubic feet, the cost per B.H.P. hour is 0·39d. With suction gas (anthracite at 24s. per ton) it is 0·24d.; but the value of the extra items amount here, according to my observations, to an additional 0·171d. per B.H.P. hour. These figures were given according to

my own local experience; but they will, of course, vary with local circumstances.

All the advantages of town gas are vigorously urged, such as: (1) There is practically no attendance needed, provided the engine is of a reasonable size. (2) There is no uncertainty of supply; the gas is always available. (3) Less capital cost in the engine, plant, &c. (4) Far less attention required to the whole engine, and less wear and tear, &c. Notwithstanding these comparisons, however, there is no doubt that suction gas has come to stay, and is rapidly gaining in favour, as witness the large output by various makers—many of the plants either replacing town gas, or being used for new business, which formerly would have come to us. The Commercial Section came to the conclusion that, where the plants were not installed, an immediate drop to 1s. 6d. per 1000 cubic feet would probably keep them from coming in; but where they had been actually put in, a lower drop than this would have to be eventually made, or else the business would be missed by default.

Considering the constant improvements going on, it is my impression that, in a very short time, town gas will have to be offered at still lower prices to compete with plants over the size already named. There is no doubt that at these lower prices even large users would not be bothered with the trouble and responsibility of suction gas; and at one time I was considering a further reduction from my price of 1s. 6d in order to retain business if possible. After reviewing most carefully, however, the whole of my local circumstances, costs, &c., and with my experience of suction costs, I am bound to say I cannot, at the present time, take less than 1s. 6d. per 1000 cubic feet for large quantities, and, as stated before, have had to forego some new business.

The whole question of these reduced prices for power, consequent upon this competition, has naturally brought into prominence the subject of differential rates and methods of costing. On the one hand, it is urged that every consumer should bear the entire cost of the gas *plus* the whole capital charges, and that any reduction below this standard is made at the expense of the lighting consumers. I am bound to say that my experience and my local conditions do not back up this position; and I am strongly in favour of running out our costs on the load-factor or proportional value basis for both power and industrial loads, similar to the plan recently adopted by Mr. Meunier, the President of our Commercial Section, which is, in my opinion, the most suggestive and able commercial way of tackling the question. The majority of my power consumers, costed on this basis, pay my company much better than slot-meter customers, with all their attendant capital and staff costs, considered in relation to their consumption. Then, of course, there is the fact that we have the potential energy in our mains, which, given a free hand by Parliament, would enable us to supply the needs of power users better than any of our rivals. Any decision, however, must depend, to a large extent, upon local circumstances, as in some places such a reduced price for the whole gas used for industrial purposes would affect the revenue more than the total loss of the power business.

I have had under consideration the question of making power gas specially and distributing to power consumers only, as the district is very compact. But bearing in mind all the difficulties (parliamentary and otherwise) I am strongly of opinion that such a thing, at the present time at any rate, is practically impossible; and it seems to me that the trend in favour of lower-grade gas is leading us in the right direction. Whether coal gas, diluted either with Dellwik or producer gas, will help to lower costs is a matter of opinion. Low-grade gas—that is, of 14-candle power or under—should, however, be considered in relation to the proportion of flat-flame consumption which cannot be displaced by incandescent lighting; and it is, in manufacturing towns, very necessary to pay attention to this part of the business before making any radical change. Those undertakings which have been wise in their generation as regards expenditure of capital, with consequently less standing charges, will be in a very much better position to cope with any and every competition; also the present prevalent ideas of making the utmost value of all residuals will help us in the right direction. Vigorously pushing the use of gas for all purposes for domestic use, with no extra capital expenditure, is also a feature which will help us to reduce costs.

A matter of the utmost importance to us is the question of emergency supplies; and it is to be regretted that the clause introduced in the Mirfield Gas Company's Bill of last session was struck out. The clause was as follows: "The Company shall not be bound to supply gas to be used for power purposes to engines attached to private power or suction gas plants except after twenty-four hours' notice from the consumer on each occasion when such supply is demanded, and except for such period only as such supply can be given without interfering with the supply of gas for public or private lighting purposes, or for use for power purposes by consumers whose engines have no connection with any such private power or suction gas plant." In my own district, I have a factory now under discussion (and they have practically decided upon having suction gas) where the mains are quite small; and there is no doubt, in case of town gas being used in emergency, without notice, the whole supply of this particular district would be temporarily in danger. It is very unfair to be compelled to supply under these conditions. In this instance, I have stipulated that, as a larger trunk main will have to be laid a distance of 400 yards to give an adequate supply, the cost must be borne by the millowners, otherwise it will not be laid.

Makers of suction plants usually recommend the provision of town gas as a stand-by; and in two instances I have coupled up in the hope that suction gas would be dispensed with. But in a recent case (only three months since) I determined to "Bide a Time," having no main near the premises. The plant (not in duplicate) was started in fine form; but very shortly after I was implored to come to the rescue. There were two engines—one for driving, the other for generating electricity (no gas being used for lighting). After negotiation, I connected up our mains upon terms of a minimum consumption, and upon conditions that the owner laid gas supply pipes in the whole of the mill, so that the tenants could use which light they preferred. The usual result of people always using gas, when available, will largely swell the revenue obtained. It is only fair to add, in the other instances named, that the owners have become very good consumers of gas for purposes other than power. But compensation for "Readiness to Serve" should always be arranged beforehand. I might say my Company have had legal opinion on this question; and we are advised that, unless there is a special provision in our Private Act, exonerating us from such a supply, we are bound to use our best endeavours to give a proper supply, according to the Gas-Works Clauses Act of 1871; but that we must make the utmost of any local circumstances against the supply.

An interesting development of suction-gas has recently occurred in my district, where three of the largest consumers of town electricity for power and lighting were approached by the suction-gas people, who undertook to generate electricity at a ¼d. per unit. This is very probably a sign of the times, and indicates that electricity concerns may also have to encounter the advances of our new rival.

The foregoing notes have been suggested almost entirely about suction gas; but those of us who have an electricity supply, will recognize that, recently, strenuous efforts have been made by our rivals to increase their power loads. As a rule, electrical engineers have no "monopoly" notions, and do not hesitate to adopt modern commercial business methods. Electricity for power purposes has its own advantages, and my own experience is that, for small loads, up to 4 H.P., it seems to have preference, especially where the load is not constant. Electric motors are less costly than engines, and their cleanliness and "up-to-date" claims are pushed to the uttermost; but nothing is said of speed, uncertainty, wear and tear, &c.

Several of the local mills drive each machine separately, relying upon the saving in shafting and intermittent use, to make up the higher running cost. In a case, about a month since, I was in competition with suction gas and electricity, for a 26 H.P. plant, with lighting equipment; and, to my utter astonishment, electricity was adopted—the quoted price being ¾d. per unit, less 5 per cent. The following are local electricity prices for power purposes:

250	units per quarter . . .	2d. per unit, less 5 per cent.	
250/1000	,, . . .	1¾	,, ,,
1000/2000	,, . . .	1½	,, ,,
2000/4000	,, . . .	1¼	,, ,,
4000/6000	,, . . .	1	,, ,,
Over 6000	,, . . .	¾	,, ,,

At our prices for gas, however, even these low figures run out at more than twice the cost of gas for an equal load.

From the Electrical Journals, we learn that most towns are keenly striving for business, by quoting specially low prices; and in a certain district the electricity authority are prepared to buy out gas-engines, and, if necessary, gas plants, at a valuation, and instal motors in their stead, on the hire-purchase system, and guarantee to find power at slightly lower prices than now paid. It has not yet, however, been shown that electricity can be profitably sold at less than 1¼d. per unit. It behoves us, however, to look out for developments in this direction.

Discussion.

The PRESIDENT (Mr. J. H. Brearley) said the paper before them was one of those which should provoke a very entertaining and profitable discussion, inasmuch as the reader had placed before the members the exact points which they all felt they wanted to discuss. He hoped there would be no reluctance to speak on the question, so that it might be thoroughly threshed out.

Mr. STEVENSON said he had no diagrams to place before the meeting, as the subject was presented more in the nature of a commercial than a technical discussion; but he had various figures with regard to tests extending over three years, which were not incorporated in the paper. His chief idea was to ascertain whether suction gas was really the competitor which it was stated to be by the makers. There might be a difference of opinion about that; and it was desirable for them to look into the matter to see if they could do anything—first of all with regard to keeping their present power business, but more especially to obtaining business in the future. They had to remember, of course, that the gas industry was not living just for this alone; and if they were not in a position to meet the suction gas business, or if it were not desirable to meet it, then what were the conditions which would enable them to hold their own; and to what extent would they be able to do so?

Mr. S. MEUNIER (Stockport), as one who had not had any competition with suction gas, but had long foreseen the possibility of it, remarked that he wished to say a few words. Mr. Stevenson's

experiences, as related to the Commercial Section before he put his views in the form of a paper, were such as were calculated to make any engineer or manager of a gas undertaking think, and think deeply. Taking the assertions and the advertisements of the various suction-gas plant manufacturers, they promised things and they gave facts from their point of view which they, as gas managers, could not realize, but which were liable to tempt the consumer of gas for power. Such a figure as $\frac{1}{10}$d. per H.P. per hour looked very tempting; but he thought the experience of those who had put down suction-gas plant had somewhat tended to alter their original views. At the same time, whether these views were clouded or whether they were not, whether this $\frac{1}{10}$d. per H.P. per hour was realizable as an absolute fact at the end of the year in pounds, shillings, and pence, did not materially affect the question from the gas engineer's point of view. If it cost such a figure as had often been stated—namely, ½d. per H.P. per hour—with ordinary coal gas, and power could be obtained with suction gas at anything between $\frac{1}{16}$d. and that amount, they, as business men, would naturally look into the question with a view to adopting the system. They did not trouble themselves with the possibility or probability of accidental stoppages which might alter the figure of $\frac{1}{10}$d. and make it dearer even than the ½d. It offered them something; and they were willing to experiment with it. The point of view from which they had to look at the matter, as he had tried to point out in his Presidential Address last year, was that this was a competing power—it was a thing which they had very carefully to watch, in order to see whether it was worth fighting. In his opinion, prevention was better than cure; and, in order to prevent even the starting of such a competition, the great thing was to forecast the probability of the future, and so order their own house as to prevent the competition being effective. In his own case, they had done pretty well. If they had the assistance of the same wise Government in every case which they had a right to expect (but which was only obtained in perhaps a few cases), then the fetish that had held good for so many years, of money paid in relief of rates or excessive dividends, would be driven out of the way, and they would have a better opportunity of reducing prices to such a limit as would absolutely prevent the competition of suction gas, Mond gas, or anything else. This was the point they should all strive for. First of all, they should look to the point of view of modern competition, and then the value of that competition. The question was, How could they so order their own houses as to reduce the cost of manufacture and bring about the reduction of price which they all of them knew was necessary to fight any sort of competition? And to this extent he was a little bit afraid that, as a body, they did not altogether secure the help which they ought to have. When they heard of such a figure as 1s. 6d. per 1000 cubic feet for sinking fund and interest, while another only had 1½d.—when they heard of £50,000 paid in aid of rates—this all militated against the possibility of fighting competition. They often heard the argument: "We provide the money; and we are bound to keep the price of gas up. We must have something in aid of the rates, because if anything goes wrong we shall have to find the money." Had they ever found any money? Never in his experience. The old idea which used to hold good, and was to a certain extent the fact, that 1d. in the pound on rates represented 1d. per 1000 cubic feet on gas, had been exploded. Some years ago, in Manchester, they were going very carefully into facts and figures, with a view of ascertaining exactly how the matter stood, because the Chairman of the Committee felt deeply that this contribution to the rates was very unfair. He had never heard the result of the inquiry; but he knew that 1d. per 1000 cubic feet meant more than 1s. per pound on the rates. He was confident that the gas industry as a whole—given facilities, and worked on the right basis, with an endeavour to make a good, sound commodity at the lowest possible rate—could fight suction gas, electricity, or anything else. But while suction gas had a free hand, and electricity was very often largely helped out of the rates, gas was submitted (reasonably at one time, but unreasonably now) to restrictions which ought not to be imposed upon it. It was like one man fighting another who had both hands free, while one of his own hands was tied behind his back. He thought it was time that the profession sought, as a united body, to have the same facilities given to them as were accorded to their competitors. The sulphur restrictions had been removed, and the illuminating power had been allowed to come down; but there were many other things that were required. If they were only treated in the same way as their competitors, he thought they could hold their own, and their good old gas would still be at the top.

Mr. G. W. Tooley (Manchester) said he had never yet been able to understand the feverish haste with which some gas undertakings had run to the assistance of the power-gas users; neither could he follow the policy which gave to one small section of the consumers so great an advantage over the larger section. It was only due to the fact that the loss occasioned by the suction gas was overwhelmed by the profits on the lighting and heating departments that they were able to view with complacency what would, by itself, present the most remarkable state of affairs. They were all, of course, very anxious to retain and develop their business; but it seemed to be a cut-throat policy to attempt the retention of business on such lines as had been quoted in the paper. When one heard of gas being offered at 1s. per 1000 cubic feet and being refused at that price, he thought it was quite time to consider the expediency of dropping it altogether, and devoting their energies to the popularizing of heating and cooking stoves, which, he ventured to think, would afford a very great field for exploration, and would also give a good opportunity for development, and be a source of income. He had very much sympathy with Mr. Stevenson in the difficulties he had to face; but he considered that his energies had been rather misdirected. If he had utilized his time in the direction he (Mr. Tooley) had indicated, by giving to heating and cooking customers the same privileges that he had offered to his power customers, he would very soon have regained the loss that might have occurred by the defection of power gas users.

Mr. W. Whatmough (Heywood) said he took a very cheerful view indeed of the paper. It was full of good news for them. Mr. Stevenson clearly proved that suction-gas plant could not get on very well without their help, and, in his experience, they were very good customers. They were not replacing their engines, but were replacing steam-engines for the supplying of electricity. They were being put into many small works instead of small steam-engines; and in this way gas-makers were getting part of the custom, if not the whole. They would rather have the whole; but a part was better than nothing at all. In his own town, they supplied gas-engines on the hire-purchase system, and charged 2s. per 1000 cubic feet for the gas. He had found out that, if his Committee had reduced the price to large customers by 6d., they would not have had a single suction-gas plant in the district. He thought they ought to make it easy for the consumers to put in gas-engines and supply them with gas at 1s. 6d. per 1000 cubic feet, and then they would not be bothered with the worry and inconvenience of a suction plant.

Mr. A. E. Mottram (Ossett) said he should not like it to go forth from the meeting that it was necessary to sell their gas at 1s. 6d. per 1000 cubic feet to meet suction plant. This matter had been under discussion several times at their Commercial meetings; and it had been clearly shown that 2s. per 1000 cubic feet was quite sufficiently low to put the price in order to meet the competition—in fact, he believed in one case it had been put at 2s. 3d. So that, considering the working cost in the holder was practically 10d. per 1000 cubic feet, he thought they could meet the competition very well indeed. There was one point in Mr. Stevenson's paper which the Institution ought to take into consideration, and that was with reference to the fixed charge they ought to be entitled to for supplying in cases of emergency. They should have power to make a special charge similar to the stand-by clause that was endeavoured to be obtained in Parliament last session. He thought it was very important that people who had suction plants ought to be made to pay for the conveniences they obtained from the producers of gas.

Mr. R. Watson (Doncaster) expressed agreement with several of the speakers that suction gas competition, if fairly compared, was not so serious a thing as it would appear to be on the surface. The claims made by some suction-gas plant sellers—viz., 1-20th of a penny per B.H.P.—were based on tests conducted under very exceptional conditions, and with a low-priced anthracite at 9s. 3d. per ton. As a matter of fact, anthracite could seldom be bought at this price. Its cost was much greater, and the prices were going up. In his own district, anthracite peas cost 26s. per ton delivered; and he knew of one case where 30s. to 31s. was being paid in order to get a good clean fuel. This suggested the importance of the nature of the fuel itself. The tests of suction-gas plants made at Glasgow by the Agricultural Society in 1905, on which the claim of 1-20th of a penny per B.H.P. was based, were conducted under exceptional conditions. The tests were for ten hours, and started with fully-charged producers, clinkered fires, and engines already running; thus avoiding all stand-by and other losses. All unburnt fuel, after pricking up fires, was returned to the generators; and the whole plant was under close supervision. It was thus that the low fuel consumption of 0·9 lb. per B.H.P. (both the full and the half load average) was obtained. Taking some of the Glasgow figures and others given by suction gas authorities as data, an estimate was made to suit the conditions of his own district. At Glasgow, the fuel consumption was, as stated, 0·9 lb. Now, Mr. Campbell, in his address to the Huddersfield Engineering Society, gave the fuel consumption for producer gas as 1 lb., and 1¼ lbs. including stand-by losses; these losses accounting, therefore, for an increase of 25 per cent. in the fuel. In the estimate, however, an addition of 20 per cent. had been made for this and other losses; bringing the fuel from 0·9 lb. to 1·08 lbs. per B.H.P. Take, for instance, a 50 B.H.P. gas-engine, with an average load of 35, working during a year of 50 weeks of 56 hours, which was equal to 98,000 B.H.P. hours. The larger Glasgow producer plants (20 B.H.P. capacity) averaged in capital cost £4·2 per B.H.P.; and a 50 B.H.P. plant would cost, therefore, about £210, or with foundation (say) £220. The engine and its actual cost were not included. Now, interest and depreciation at 10 per cent., and repairs at 5 per cent. (the latter figures, being £11 a year, could not be considered excessive), meant an annual charge of £33, which, with £5 given by one maker of suction-gas plant as required for extra oil and stores, gave £38, to be divided over the year, or equal to 0·093d. per B.H.P. Then fuel, 1·08 lbs. of anthracite, at 26s. per ton delivered, 0·150d.; labour (say) three days a week, at 5s., and this to include attendance, periodical cleaning, removal of clinker, &c., from the premises, 0·092d.; water, 1 gallon per B.H.P., as given by one authority, 0·012d.—total, 0·347d. But on starting new works

the owners were bound to provide a site and building for the producer plant. Putting this at £100, and interest at 5 per cent., equals 0·012d.; which gives a total of 0·359d. per B.H.P. for suction gas. This would appear to be the lowest figure possible if the ordinary conditions were taken into consideration. Now, the cost per B.H.P. of Doncaster town gas for the engine in question would work out, on the basis of 17 cubic feet per B.H.P., at 0·38d., at the present price for power of 2s. 1d. less 10 per cent.; and the saving, therefore, with suction gas could only be 0·021d. per B.H.P., or equal to £8 11s. per annum. This was surely not sufficient to justify the adoption of suction gas, particularly as no allowance was made for extra supervision, risks, absence of duplicate, extra cost of engine, and contingencies. That there were risks Mr. Stevenson had pointed out. The Home Office recognized this, for, in the case of producer plant in factories, they had issued regulations which, while suggestive, might well become mandatory. These provided for the posting of notices as to the nature of the gas, the employment of two men at least whenever the plant was opened and cleaned, and the person in charge to be free from heart and lung disease. The figure 0·359d. per B.H.P. given for suction gas was equal to about 1s. 8d. to 1s. 9d. per 1000 cubic feet for town gas; and, remembering the risks and contingencies, it was a question whether a price between this and 2s. per 1000 cubic feet was not a fair competitive figure in the supply of town gas. That the price for power gas should be lower than that for lighting was right, since gas-engines were used principally in the daytime and evenly, and capital costs were not materially increased. But there was no reason why town gas should be supplied at a price below what suction gas really cost.

The PRESIDENT said he thought it would be well to adjourn the discussion till their next meeting, by which time possibly there would be a great deal more information to be brought forward on the subject.

Mr. STEVENSON said it must be clearly understood that the cost of suction gas varied considerably, owing to local circumstances. He should be glad to have an opportunity of checking Mr. Watson's figures, as he had been very much interested in them. He did not propose then to touch upon the whole of the remarks that had been made. He was in no feverish haste to take on business except that which paid him well. Therefore he was not running any risk in this respect. With regard to the cost of fuel for suction-gas plant, taking the cost of anthracite only per B.H.P., either on the full or on the average working load, it was half the cost of gas at 1s. 6d. per 1000 cubic feet. It must be remembered that the cost of gas per B.H.P. varied with the calorific value; and it was only the very large consumers who got their gas at 1s. 6d. It would be utterly absurd to sell gas at this price for small engines. If the members would kindly bear in mind local circumstances, and give him any further costs, he should be only too glad to discuss the matter at the next meeting, if he was able to be present.

The further discussion of the paper was then adjourned.

Scottish Junior Gas Association—Western District.

The members, to the number of 40, journeyed to Hamilton on Saturday afternoon, and inspected the Earnock Colliery. They were met by Messrs. Thomson and Stevenson, and, after being divided up into small parties, were shown over the colliery. The pit-head plant excited much interest, being of the most modern construction. The underground workings were then seen; the substantial and permanent nature of the mines giving rise to comment. On returning to the pithead, a hearty vote of thanks to the management was accorded by the members.

Midland Junior Gas Engineering Association.—We learn from the Hon. Secretary (Mr. James Hewett) that the next general meeting will be held at the Technical School, Birmingham, on Saturday, when a paper will be read by Mr. A. O. Jones, of West Bromwich, on "Benzolized Water Gas."

Cultivation of Ramie.—In previous issues of the "JOURNAL," reference has been made to the use of the above-named material for the manufacture of mantles for incandescent gas lighting. We learn that an Association has been formed, under distinguished patronage, and with Mr. D. Edwards-Ratclyffe as Hon. Secretary, to give general encouragement to the growing of ramie by popularizing knowledge concerning its value and uses; to supply information, seeds, and assistance to planters desirous of cultivating the fibre; and to give help to both grower and manufacturer by placing them in touch with each other.

Explosive Combustion of Hydrocarbons.—At a recent meeting of the Chemical Society, a paper on this subject was submitted by Messrs. W. A. Bone, Julian Drugman, and G. W. Andrew. The authors have further examined the phenomena associated with the "inflammation" of mixtures of ethane or ethylene and oxygen corresponding to $C_2H_6+O_2$ and $3C_2H_4+2O_2$ respectively, by a method which allows of discrimination between the various products according as they rise at an earlier or a later stage in the flame. In each case, steam, aldehydes, ethylene, and acetylene are prominent during the initial stages of combustion; while carbon is a later product. Steam is decomposed by carbon at high temperatures so rapidly that prolonged duration of the flame diminishes the quantity of water which separates on cooling.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

A Visit and an Address.

It is not surprising that there should have been an excellent muster of members of the London and Southern District Junior Gas Association last Saturday afternoon at Kensington High Street, in response to an invitation to inspect the show-rooms of the Gaslight and Coke Company, and to hear an address by Mr. F. W. Goodenough, the Chief Inspector of the Company. On their arrival, the members were received by Mr. Goodenough and Mr. E. Pilbrow (the Inspector in Charge), who took great trouble to point out and explain the numberless up-to-date appliances which the handsomely fitted up show-rooms contain. In this they were ably assisted by Mr. C. H. Ditchman, the District Inspector, Mr. H. Rothwell, the Head Salesman, and Mr. Smithers, the General Foreman. Some particulars of the show-rooms, together with photographic reproductions of different parts of the interior, will be found on p. 593. At the conclusion of the inspection, the party (which numbered over sixty, and included Mr. H. Austin, one of the Employee Directors of the South Metropolitan Gas Company) sat down to tea, after which,

Mr. GOODENOUGH said it had given him great pleasure to welcome the members of the Association there that afternoon; and he would like to give a special word of welcome to Mr. Austin, whom they were all delighted to see among them. He hoped the members had found sufficient interest in the show-rooms to make them feel that the visit had not been a waste of time. He said he would also like to take this opportunity of thanking the members for the honour they had done him in electing him an Honorary Patron of the Association; and he assured them that he would do his best in this position to forward the interests of the Association, and to bring about an increase in membership if possible. Mr. Goodenough then read the following address.

THE WORK OF THE OUTDOOR STAFF.

I am glad to know that the number of members of the London and Southern District Junior Gas Association is steadily increasing, and that many of the officers in my department are becoming members, as I have a very strong belief in the value of the free discussion between members of the same profession of all matters arising out of their daily work, and of all freely pooling their individual experiences, so that all may benefit by the varied experiences of the many. This, while at all times desirable, is still more necessary in these days of keen competition, when the highest efficiency is required in the outdoor staff of a gas undertaking, if it is to progress as steadily and be as fully successful as those interested in it would desire. The outdoor officers of a gas company in these days need a great variety of expert knowledge, as they have to educate and advise the public on the varied ways in which gas can be advantageously employed, and in how best to use gas for each particular purpose, as well as to combat the arguments of their rivals in the supply of light, heat, and power. This involves not only a detailed practical knowledge of how gas can and should be used for domestic, business, industrial, and public purposes, but also an intelligent appreciation and an accurate knowledge of the rivals with which the suppliers of gas have to contend in the several fields of supply mentioned.

In the field of lighting, the outdoor officers of a gas company must be able to advise consumers with intelligence as to the most economical and satisfactory methods of lighting all kinds of premises, from the two-roomed tenement to the frontage of a King's Palace; and in no company's area probably is there a greater variety of consumer than in the district of the Gaslight and Coke Company. Every leading outdoor representative must be an expert in the lighting of houses, shops, factories, churches, railway stations, town halls, and other public buildings, and last, but by no means least, the public streets. He must know where gas under pressure can be advantageously used; and he must be thoroughly well acquainted with the varying standards of lighting required for the different purposes for which the premises to be lighted will be used.

Then he must not only understand all the details of gas lighting, but he must have a thorough acquaintance with all the different types of electric lamps in use, in case he has to argue the case for gas against electric light with an expert in the latter system; and for this purpose he should undoubtedly be a constant reader of the technical journals of the electrical industry. If you do not understand, and are not thoroughly acquainted with, your opponent's specialities, you cannot possibly contend against his competition so effectively and so intelligently as is desirable. Of course, the ordinary business man does not want a lot of technical argument on the question of Gas *v.* Electricity, nor does he pay a great deal of attention to theoretical figures. What he is interested in is the practical experience of other men in the same line of business or in the same neighbourhood; and it has been our experience in this respect that the old saying that "Nothing succeeds like success" is particularly true in regard to fighting electric light. It was the first step that was difficult. But as soon as we had succeeded in persuading a few consumers to displace electric light by modern gas lighting, we found that our work was rendered very much more easy, as the invariable experience of those consumers was that they obtained a very much better light for very much less money, and were so thoroughly satisfied that they were

quite willing to give particulars of their experience to other consumers who were wavering.

Here let me say that the greatest mistake that any representative of a gas company can make in fighting competition is that of exaggerating a case for his own side. The case for gas is so strong that it is absolutely unnecessary to put the claims on its behalf on the highest possible basis. It is infinitely more satisfactory for a consumer to tell you, six months after he has installed gas in place of electricity, that he has saved considerably more than you led him to believe he would, and has got even a better light than you led him to anticipate, than for him to say that, though he has saved a good deal, he has not saved as much as you told him he would. I am glad to say that I have never had an instance come under my notice in connection with any of our consumers where we have failed to make good, and more than make good, the claims that we have put forward. To mention a leading case in our district, we told the Brighton Railway that they would save £900 a year by substituting incandescent gas lighting for electric light at Victoria Station, whereas in the event they saved over £1100 a year; and undoubtedly the fact that we were found to be better than our word in regard to the old station, contributed in no small degree to our obtaining the lighting of the new station in competition with electricity at only 1¼d. per unit. Again, in the case of the City streets, the Court of Common Council only the other day had before them a report as to the saving effected in the twelve months that had expired since gas took the place of electricity in certain of their streets; and this report showed that the saving effected was 25 per cent. greater than the estimate originally placed before the Corporation. I would once more impress on all those engaged in fighting the battles of gas against its rivals the importance of never exaggerating their own case or understating the case for their opponents.

Lighting is, however, only one of the fields of enterprise in which the outdoor representative of a gas company has to learn his way. Gas is becoming more and more generally used for heating purposes. The prejudices of the British public are being steadily overcome by the growing volume of experience on the part of consumers of the wonderful convenience and comfort of this system of heating; and the prejudice against gas-fires from the hygienic point of view is steadily dying out, and has recently received a further blow from the report of the Coal Smoke Abatement Society just published in "The Lancet," which shows that the most careful and exhaustive tests proved that gas-fires had no vitiating effect whatever upon the air of a room in which they were used, provided they were properly fixed and had adequate flues for carrying off the products of combustion.

In no branch of his work should the outdoor representative exercise more thought and care than in regard to the fixing of gas-fires, as full regard should in every case be given to the local conditions, both as to the up-draught in the chimney and the ventilation of the room; and no pains should be spared to see that every gas-fire fixed is left in such a manner as will ensure its giving the consumer entire satisfaction. Every satisfactory gas-fire fixed is a splendid advertisement for gas heating, while the contrary is just as true; and no small amount of prejudice that does exist in the minds of some people to this day against gas heating has arisen from the careless and the unintelligent way in which gas-fires have been installed, not only by the handyman gas-fitter employed by local tradesmen, but even by gas companies themselves. I am confident that there is an enormous field still to be won by gas companies in the direction of heating by gas; and nothing will conduce more to the rapid adoption of gas heating than the exercise of intelligence and care in the fixing of every gas-fire and heating-stove.

Gas has also, I am convinced, a big future as a heating agent in the industrial world—especially gas used under pressure. Mr. A. W. Onslow, the Gas Engineer at Woolwich Arsenal, has recently been giving my staff some particulars in regard to the work that is being done in the direction of metal-heating at Woolwich by high-pressure gas; and our own experience shows that gas so used is a most valuable heating agency in many trades, and is likely in the future to be consumed as an industrial heating agent to a much larger extent than hitherto.

Then the gas company's representative must also be an expert in cooking by gas, as the gas-cooker is rapidly becoming recognized as a domestic necessity, and not as in any way an expensive luxury; while at the same time our experience proves that a very great number of the gas cooking-stoves fixed are not used so intelligently, and accordingly are not used to the same extent, as they would be if the consumer were thoroughly versed in the right way of employing the stove for every purpose of cooking. As you are no doubt aware, this Company have recently adopted a system of giving instruction to consumers using gas-cookers by means of lady demonstrators, who attend for the purpose at the consumer's house and give instruction on the actual stove that is being used. This system is giving very great satisfaction to the consumers, and is proving in every way a success. It has justified its own existence by revealing the extraordinary ignorance of consumers who had used gas-stoves for many years, and who were quite under the impression that they knew all about them until our demonstrators went through the whole business of cooking by gas with them. If time had permitted, I could have given you many amusing and interesting instances of the ignorance which our demonstrators have come across. A gas company's representative who has to deal with consumers ought to be able to use a gas-cooker himself; and he might very well occasionally practise on the Sunday dinner—taking the precaution of having some cold meat in the house in case his culinary efforts were not appreciated by the remainder of the household.

Then having mastered all the details connected with the use of gas for lighting, heating, and cooking, we still have not completed our education, as we have, further, to understand the use of gas for power purposes, and the relation of its cost and advantages to the cost and advantages of electric motors and of engines run by suction producer gas. All this variety of work, and the constant fighting to be done against competition, added to the routine work of distribution, undoubtedly make the outdoor branch of a gas company's business extremely interesting; but the changed conditions of the present time as compared with some years ago also call for a higher standard of efficiency in the outdoor staff, for the most thorough equipment of knowledge, and for free interchange of experience between the several officers of the same company and also between the officers of different companies. This is why I am so glad to give my hearty support to an Association such as that I am addressing.

It also, of course, demands thorough keenness on the part of every officer engaged in the work of pushing the sale of gas; and on this point, let me say to all the young men before me—Be keen from the very start. Never mind if you are in a subordinate position. Remember that you must be able to splice a rope before you can be captain of a ship; and that he who will be nothing unless he can be first at once, is likely to be nothing. Do not rail against fate and bemoan lack of opportunity. Opportunities will come sooner or later to every one of you, if you make up your minds to do all that comes within your reach as well as in you lies; if you do everything that comes to hand as if it were the most important work in the world; if you take interest in what is apparently the least interesting share of the work; and if you make up your minds to understand clearly the whys and wherefores of everything that you are called upon to do. Never blindly follow rules without understanding them. If you cannot understand the rules laid down for your guidance, discuss them with your colleagues; and if then you and they cannot understand why such rules have been framed, raise the question with your superiors. Managers want intelligent subordinates, not merely dumb, obedient servants; and no chief worth his salt will think anything but the better of a man who raises questions intelligently, or puts forward suggestions for the improvement of the system under which he is called upon to work. Believe this—Your work is what you make it. The intelligence and individuality of a man colour everything that he does; and to the keen and intelligent man no work is really uninteresting, because he will appreciate the part that he plays in the whole, and will realize that he can only become capable of managing the whole by setting himself to understand thoroughly the parts. Treat every job that is entrusted to you as if it were one of the highest importance—be yourself the most merciless critic of your own work, and only be satisfied with the best. Self-respect should make you carry out the smallest detail of your work thoroughly and intelligently, without regard to whether or not that detail will ever be subjected to the criticism of your superiors, just as self-respect would keep a man clean on a desert island.

In your dealings with the public, treat every consumer as if the success of the business depended on satisfying that particular consumer. You are certain to meet with disagreeable and "difficult" consumers in the course of your work; but treat them, not as unreasonable people undeserving of consideration, but as capable of being converted into friends of your company, and so into valuable assets. Never serve such a consumer with his own measure. Meet unreasonableness with courteous consideration, and thus do your part towards the removing of the suspicion so generally entertained by the public that that much-maligned word "monopoly" stands for arbitrary and uncommercial methods of business. Try, indeed, to remove from your mind the word "consumer," and substitute for it the word "customer"; and you will then get nearer to the relation that should exist between a gas company and the public. Every customer should be treated as you would treat him if he could go next door to buy gas instead of being compelled to come to your shop. By so acting you will do more to put an end to any demand that may exist for municipal ownership of gas undertakings than any amount of newspaper articles or public discussion could do.

In dealing with your customers, always try and realize their point of view; and, if you cannot take it, at any rate address yourself to understanding and to meeting the customer's arguments and removing his suspicions or misapprehensions. When you have to enforce a rule in dealing with a customer, explain that rule, and do not merely enforce it. The rules laid down by a gas company to regulate their relations with the public have a basis in common-sense and equity; and a courteous explanation of the reasons underlying the rules (instead of a mere intimation that "We do not do this," or "We can only do that"), will save endless friction with the customer. For instance, the rule which regulates the allowance to be made in respect of a meter proved fast sometimes appears hard to a customer, who thinks that he is entitled to an allowance for a much longer period than the previous quarter; but a courteous explanation of the fact that, if the case had been reversed and the meter had been found slow, the same rule would have been adopted, even though it were apparent that

the meter had been slow for a considerable length of time, will at any rate go a long way to convincing the customer that you are dealing with him in an equitable manner. Complaints and disputes should never be resented. Customers rarely make complaints or dispute their accounts unless they think they have cause. If they have none, then endeavour to discover the reason for the misunderstanding, so as to be able to remove the misapprehension and once more get the customer satisfied and friendly.

To sum up all that I have occupied so much of your time in saying—Learn all you possibly can about your own business and about that of your rivals; take interest in every detail of your work; whatever your hands find to do, do it with all your might; and adopt as your permanent motto in dealing with the public the truism that "The success of a gas company depends upon the satisfaction of their customers," because it is the customers' money that pays wages, salaries, and dividends.

I will conclude by wishing the Association every success. May it prove of great utility to every member, and so to the gas industry as a whole.

Mr. W. Upton, the President of the Association, proposed a hearty vote of thanks to the Gaslight and Coke Company for the privilege of inspecting the show-rooms, and to Mr. Goodenough for the time he had devoted to the visitors and for the address he had just delivered to them. He remarked that a year or two ago the Association had the pleasure of inspecting the chief station of the Company at Beckton; and he thought it was a very fitting corollary that they should meet there that day to see the other end of the business—that was to say, how the gas so made was disposed of and utilized to the best advantage. If they considered that Beckton, large as it was, was but one of the Company's stations, and that the distributing centre in which they were assembled was also but one of many, the magnitude of the Company's business would be borne in upon them; and if they further considered the task of properly conducting a business of this magnitude, they would appreciate the ability of those to whom the management was entrusted. Practically perfect satisfaction was given all round—to the consumers, to the employees, and last, but not least, to the shareholders. The address Mr. Goodenough had given them met the whole case. It was the experience of every one of them in their every-day work crystallized; and they should all keep a copy of it handy for reference.

Mr. W. J. Liberty seconded the proposition, and remarked that, when Mr. Goodenough promised to address them, he wondered how he could find time to do so. He thought it could only be for the following reasons: First, that a busy man always found time to take up a little more work; secondly, the great interest that Mr. Goodenough took in his business; thirdly, his anxiety to give a helping hand to the younger ones—not only those under him, but all connected with the gas industry; and, fourthly, his determination to make the city he lived in the best lighted and brightest city in the world. At any rate, it was very kind of him to give up his Saturday afternoon to them as he had done. There were two words that were brought prominently before them—"Efficiency" and "Equipment." They heard a great deal about the former now. It was said that over the portals of all works and houses of business should be written large the word "Efficiency." This was true; but there was a companion word that should go with it—"Equipment." They could not be efficient unless they were thoroughly equipped; and Mr. Goodenough had told every young fellow how to go about his business. An advertisement had appeared in one of the electrical papers asking for a number of short paragraphs giving striking reasons why householders should use electric light, and others calculated to induce power users to adopt electric motors. It was added that paragraphs must not be longer than about half-a-column of the "Electrical Engineer," and that "We pay well for suitable paragraphs which are likely to attract and retain the attention of readers." The electrical industry must be in a very bad way indeed, when it had to resort to the expedient of putting such an advertisement in a prominent part of an important paper. He thought the gas industry was on the winning side, because they had not to insert advertisements in their papers asking for paragraphs of the "penny-a-liner" type which would cause people to drop electricity and take up gas. Now gas people, if they knew how to use it, had all the information that the other side were begging for. They should use it. What they had seen that afternoon should show them all how to conduct their business.

Mr. Austin said he was very pleased to be with the Association that afternoon, and to hear the address by Mr. Goodenough. He hoped every employee of the Gaslight and Coke Company would read the address; and he would endeavour to see that the South Metropolitan employees did so also. It was an address that those who heard or read would long remember; and at times of disappointment or anxiety they would derive comfort from the inspiriting words of Mr. Goodenough. In the name of the South Metropolitan Company, he thanked Mr. Goodenough for his address, which he trusted would be a lesson to them all.

The vote of thanks having been carried with applause,

Mr. Goodenough made a brief acknowledgment. He remarked that Mr. Liberty had given them a little encouragement by reading the advertisement which had appeared in the "Electrical Engineer;" and he would also like to thank Mr. Austin for the extremely kind way in which he had spoken. It had been a great pleasure to see Mr. Austin there that day.

ELECTROLYTIC ACTION ON PIPES.

In a paper on "Single-Phase Electric Traction," by Mr. C. F. Jenkin, B.A., which was read before the Institution of Civil Engineers on the 13th inst., and discussed at last Tuesday's meeting, some reference was naturally made to the subject of electrolysis. The author advocates the system of single-phase working, as fulfilling all the requirements of general railway traction, as against alternating currents; and the question crops up as to which method gives the least trouble as regards electrolytic action on pipes. Mr. Jenkin says that our knowledge of the rules which govern electrolysis produced by alternating currents is very limited—much less do we know of its actual results upon pipes in the ground. He notes a summarized theory and a bibliography of the subject which appeared in the "Electrotechnische Zeitung," Vol. XXVII., p. 221, and also some experiments described in the "Electric Journal" for 1905, Vol. II., p. 668. These experiments referred to iron and lead pipes which were buried in the ground twelve months, and subjected to alternating currents. Similar tests were made with continuous currents. No certain effect could be attributed to the former currents; but the continuous current pitted the metal. This would seem to show that, as regards electrolysis of pipes, there is less to be feared from alternating than from continuous currents. Mr. Jenkin also mentioned a trial made by Mr. A. P. Trotter, which showed alternating-current electrolysis to be about half that from continuous-current.

The latter-named gentleman took part in the discussion last Tuesday, and showed two pipes that had been experimented upon at Bramley, Leeds. They were $1\frac{3}{8}$ inches in diameter by 24 inches long, and a space of 18 inches had been left between them. A current of 1 ampere was passed for an hour at 40 volts. Pitting was distinctly shown, and a deposit of white carbonate of lead. Though this was so, there could be no doubt that there was less electrolytic action with alternating than with continuous currents. With the latter, in one case, the pipe altogether disappeared. He thought that the "good old rule" of a 7-volt drop had hurt neither the tramways nor the pipes.

With regard to the Board of Trade limit of 7 volts, the author of the paper remarks that it has no logical basis, but is merely the result of experience, though we must say we do not see how it is any the worse for that. He admits that if this limit of loss be maintained, continuous-current railways will be obliged to use a fourth rail for the return circuit; and he considers that this would be unfortunate. He argues that, except in particular cases, there is no need for any such restriction; but that special precautions should be taken to guard against electrolysis where pipes are close to electric railways. We may add that when such railways are extended, it will be more than ever incumbent upon the managers of gas and water undertakings to take care that every requirement is insisted on for the adequate protection of their mains.

Falk, Stadelmann, and Co.'s New Lamps.

Messrs. Falk, Stadelmann, and Co., of Farringdon Road, have prepared some attractive looking circulars of their "Vesta" and "Radium" inverted incandescent lamps, which are suitable either for indoor or outdoor lighting. Readers of the "Journal" are already familiar with the lamps, as reference to them has been made in the issues for Sept. 4 (p. 643) and Sept. 18 (p. 767). A recommendation of both types is that they are absolutely shadowless—of course, with the exception of the shop window form of the "Vesta," which is fitted with a parabolic reflector. Both lamps are made in various sizes. The one-light form of the "Vesta" is stated to give 125-candle power with a consumption of 4 cubic feet; while the one-light pattern of the "Radium" is claimed to furnish a light of 80-candle power, with a consumption of $3\frac{1}{4}$ cubic feet per hour, and the larger sizes in proportion. Another circular deals with the "Pharos" and the "New Pharos" high-power lamps for upright incandescent gas-burners, particulars of which were also given in our pages on Sept. 18 (p. 767). These are wind, rain, and dust proof, and are supplied to contain two, three, or four lights. These types are specially adapted for shop fronts, for which purpose a parabolic reflector can be supplied with the "Pharos" pattern, so as to give a powerful light in one direction. The "New Pharos" is provided with a registered globe so shaped as to dispense with the usual copper cup at the bottom, and thus a shadowless light results. Also, the method of construction followed with this form dispenses with the use of screws on the outside of the casing, and thus the usual corrosion at these points is obviated; while the burners are provided with adjustable nipples, which can be easily regulated on the spot, without removal, to suit local conditions of pressure, &c.

The King has approved of the appointment of Sir James Woodhouse to the office of Railway Commissioner rendered vacant by the death of Sir Frederick Peel. Sir James is a well-known solicitor in the North, was President of the Association of Municipal Corporations, and has frequently been Chairman of Committees on Private Bills.

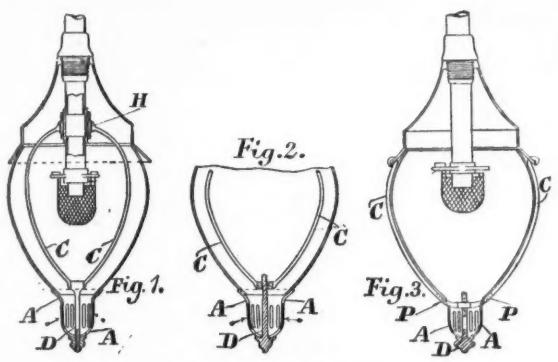
REGISTER OF PATENTS.

Holders for Inverted Lamp Globes.

HELPS, G., of Nuneaton.

No. 24,457; Nov. 27, 1905.

The patentee describes means of securing globes to inverted gas-burners. In fig. 1, A is the holder or globe support, which also acts as a draught screen; the air required for combustion passing in through slots, as indicated by the arrows. The globe has wire supporting arms C, at the lower extremity of which is a screwed spindle D, passing through the holder and having at its extremity a nut. Above are loose screwed collars for fixing the position of the collar H, to which the arms C are attached. The guide keeping the top of the globe in position is attached to the burner-tube above.



Helps's Lamp-Globe Supporter.

Fig. 2 shows another form the invention may take. Here the holder which supports the globe is held in position by the spindle D passing through a screwed collar at the extremity of the supporting wires.

Fig. 3 is another form—the supporting arms or wires and the holder being here outside the globe. The holder is slotted at P to allow the wires C to pass through.

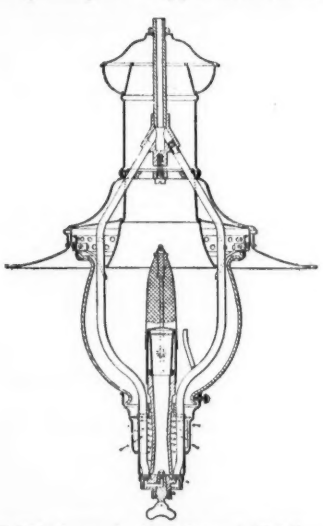
Lamps for Incandescent Burners.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 1455; Jan. 19, 1906.

This invention relates more particularly to incandescent lamps for use with high-pressure gas, and has for its primary object to provide a construction of lamp wherein the enamelled parts are held together without screws passing through the enamel. The invention also refers to means for admitting the air supply and for supporting the globe in position.

In accordance with the invention, the "enamels" comprise five main portions—a cowl, a perforated distance-piece, the lamp body proper, the reflector, and a cone. The cone is suspended (as shown) from a gallery connected to the tubular gas stem, and is provided with a shoulder from which the reflector is suspended. The lamp body rests on the reflector; the distance-piece, on the top of the lamp body; and the cowl, on the distance-piece. These five parts are held together by the stem and a nut pressing on the upper face of the cowl.



Keith's Lamp for Incandescent Lighting.

There are two air supplies, one coming through a gallery beneath the reflector serving to complete combustion at the mantle and to ventilate the lamp, and the second being admitted at the bottom through perforated casings surrounding the lower part of the burner and cutting off this supply from the upper portion of the lamp. Thus it is possible to use a high-power burner with a relatively small globe, and "avoid the disadvantage ensuing from taking the air supply to the burner from the same source as for the ventilation of the lamp, in which case the air supplying the burner becomes so heated and expanded as to render it impossible to force sufficient oxygen through the burner to give the correct mixture in the bunsen flame."

The gas supply from the vertical tubular stem is led to the burner through a tube bent to suit the contour of the globe, and preferably controlled by a cock constructed on the principle described in patent No. 16,773 of 1902. The supply from the cock to the bye-pass jet may be conducted through a second tube, which is closed at the top and is supported from the said stem.

The hot air in the upper portion of the lamp is cut off from the cool air supply to the burner by a flange on the interior one of the two casings and by a flanged sleeve fitting closely a flange on the burner body, but permitting the burner to rise and fall therein.

The outer casing, which supports the globe, is held in position by triggers, hooked into the upper portion of the inner casing and pressed outwards by two wire springs which hook into the same slots as the top triggers; compression being put on the springs on screwing the flanged sleeve down on the inner casing. To lower the globe and the outer casing, the triggers are pressed inwards by the fingers, so as to allow the bottom of the outer casing to pass over. In replacing the globe, the outer casing is passed up over the triggers till they spring out and prevent its return.

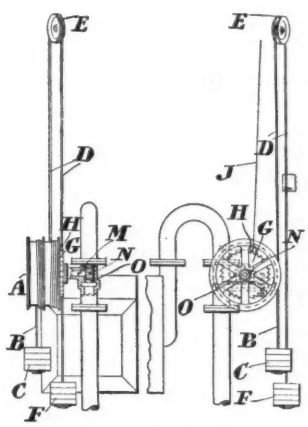
The gallery through which the first air supply is admitted is arranged so that the flange on the top of the globe rests in the bottom of the gallery, and the gallery is prevented from dropping by means of blocks held in position by nuts. To the blocks are attached wire loops, which pass round the suspension gas-tubes, so that when the globe is lowered a certain distance it is suspended by the tubes.

Automatic Gas Cut-Off.

BRECKNELL, H., of Bristol.

No. 25,186; Dec. 5, 1905.

The arrangement of this automatic gas cut-off for fire prevention consists of a double faced and flanged pulley A, fixed to a pinion spindle M, in place of the ordinary hand wheel of a "Donkin" gas-valve of the rack-and-pinion type. A chain B is wound round one of the faces of the pulley, and a weight C attached to the free end, to operate and close the valve by means of the rack O and pinion N.



Brecknell's Gas Cut-Off in Case of Fire.

Around the other face of the pulley is wound a rope D, passing up through the floors to the top of the building, and over at the top a sheave wheel E, attached to the end of which is a weight F sufficient to overbalance the weight C, and keep the valve open. Attached to the pulley A is a ratchet-wheel G, with which a pawl H engages in such a manner that the valve may be kept open to any required degree. But when once the valve is shut, it cannot again be opened until the pawl is pulled out of gear—if preferred, by means of a cord J passing up through the floors of the building, alongside the balance-weight rope D.

In the event of fire taking place, the rope D would burn, and the weight F attached to it would drop, so allowing the other weight C, attached to the chain B, to close the valve; and the pawl H, engaging in the ratchet G, would retain the valve in its closed position.

Movable Gas Plants.

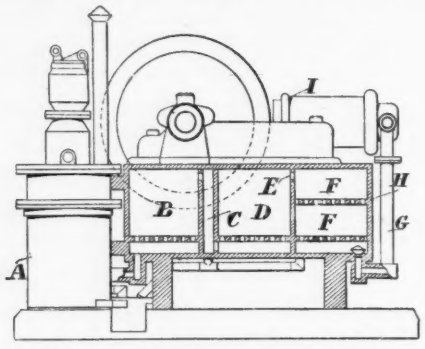
HURLEBUSCH, H., and HERRMANN, H., of Lehrte, Germany.

No. 667; Jan. 10, 1906. Date claimed under International Convention, Feb. 15, 1905.

This invention relates to portable gas plant consisting of gas-producer and purifying-chamber mounted on a common base; the purifying-chamber forming a support for the gas-engine. The invention is said to differ from previous ones in the same field in that "the various parts are more suitably arranged, whereby the plant takes up less space." The mounting of the engine (particularly the fly-wheel) is such that "a more perfect equilibrium is maintained, so that the combined plant is more efficient than others previously in use." The essential feature of the arrangement (p. 618) is a horizontal cylindrical chamber, on which the gas-engine is mounted, containing all the apparatus for cleaning and cooling the gas. This arrangement is given in side view, partially in vertical cross-section, but without the carriage.

The tank H serves as a support for the engine I, which is directly mounted on it. Inside the tank is the apparatus for the cleaning and cooling of the gases. The producer A is mounted outside the tank.

The gas passes from the producer A to the first cleaning and cooling chamber B, from here, through the connecting channel C, towards and through the second cleaning and cooling chamber D, which it leaves through the opening E, in order to pass through the third cleaning and



Hurlebusch and Herrmann's Movable Gas Plant.

cooling chamber F. The chambers are all filled with coke and sawdust, and provided with a water sprinkler and water discharge pipes. The cooled and purified gas feeds the engine through the pipe G.

Valve Faces and Seatings.

HAWKYARD, J., and METERS LIMITED, of Manchester.

No. 2434; Jan. 31, 1906.

This invention relates to stop valves for use on gas or water mains; the seatings being made of a cork bedding "more conveniently and effectively arranged than hitherto." In one application of the invention, as shown in fig. 1, in connection with a stop or regulating valve suitable for a gas-main, the valve casing or body is made from two flanged cylindrical castings A B bolted together. Within the casing is a valve-seat; the portion upon which the valve abuts being formed from a circular disc C of lead or some soft non-corrosive metal, and made to project above the seat face. The valve itself consists of a circular plate or annular disc D, provided with a guide stem E, and adapted to be raised and lowered by a bell-crank lever F operated from the exterior. The face of the valve is grooved to receive a

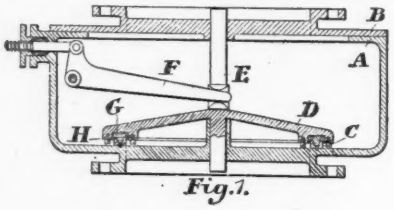
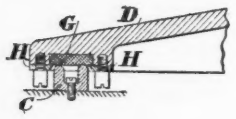
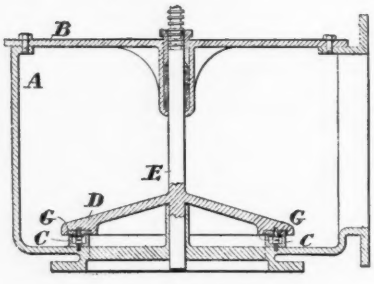


Fig. 1.





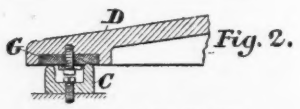


Fig. 2.

Hawkyard's Valve-Seatings.

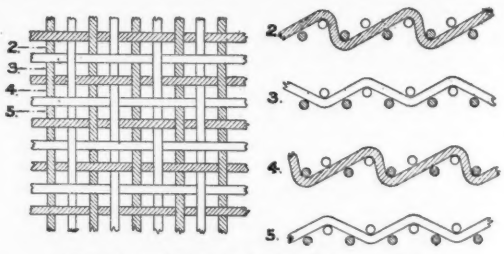
filling or bedding G of cork secured therein in one manner by junk rings H, or their equivalent. A sufficient annular space is left between the rings to enable them to fit over or clear the projecting seat portion C, and so that the cork may take a direct bearing over the whole of the upper extremity of it. The seat portion or ring C is formed with a groove between its outer and inner peripheries; and to ensure a gas-tight joint, it is arranged that the inner of the two annular valve-seating surfaces thus provided shall project above the outer surface, as fig. 1. The heads of the screws, by which the junk rings are secured in position, may be prolonged so as to serve as guard stops to prevent the seat rings from cutting too deeply into the cork bedding. Or, instead of junk rings for securing the cork in position, there may be a ring K secured by screws, as in fig. 2. The valve shown in fig. 2 is arranged for a right-angle flow of the gas through it, instead of a straight flow as with the valve shown in fig. 1.

Incandescent Mantles.

WHEATLEY, W. H.; a communication from FROWEIN and WIESCHER, of Barmen, Germany.

No. 13,682; June 14, 1906.

This incandescent mantle, specially suitable for powerful burners, consists of a double-wove fabric made of a fabric with two grounds connected with each other by suitably crossing different meshes or cross weavings of threads of the one ground with the adjoining ground. The two fabrics lie one above the other, so that the threads of the one do not cover those of the other, but are arranged so that all the threads are visible, and the radiating effect of the outer, as well as of the inner, fabric is utilized. Moreover, the disadvantage is said to be obviated which occurs when two incandescent mantles are employed and placed one over the other—viz., the diminution of the illuminating power of



Froweln and Wiescher's Two-Fabric Mantles.

the inner mantle by the threads of the outer mantle—while the advantage of two mantles (increased power and durability) is preserved. The double fabric has the further advantage that, in case of damage to the outer fabric, not only does the inner fabric remain intact, but any extension of the damage to the outer fabric is prevented, as the nearest adjoining cross threads prevent the cross weaving from getting loose.

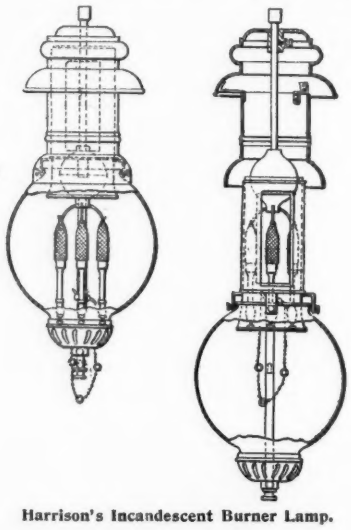
The double fabric consists of two ground fabrics, of which the inner one is indicated by the hatching of the threads. The fabrics are interwoven with one another by the crossing of the one fabric with different threads of the other.

Lamps for Incandescent Lighting.

HARRISON, C. W., of Middlesex Street, E.C.

No. 13,839; June 16, 1906.

This invention relating to gas-lamps has particular reference to the kind which are provided with movable tubular screens or similar devices to prevent the mantles from being injured by wind or draughts of air when the globe is moved from its position enclosing the mantles; the said tubular draught screens having doors in them to permit of ready access to the mantles when it is desired to inspect or replace them.



Harrison's Incandescent Burner Lamp.

Hitherto this door has been hinged to the draught screen, or adapted to slide in guides on it, after the manner of a shutter; but this invention provides that two concentric cylinders capable of sliding telescopically, and having an opening formed in one or both of them, are adapted, when they are in their collapsed position, to form a guarded way for the admission of air, and, when in their extended position, to permit of access to the mantles. The dimensions of the opening are regulated for adjusting the passage for air to the lamp by a ring or sleeve having a lateral opening and capable of being turned about the concentric cylinders.

The tubular draught screen is provided (as shown) with an aperture of suitable dimensions, and is surrounded by a cylinder or tubular jacket having a corresponding aperture, so that by angularly displacing

the tubular jacket, the two apertures may be made to coincide or not, as required, or the tubular jacket may be unprovided with the aperture, in which case the aperture in the tubular draught screen would be exposed by sliding or longitudinally moving the tubular jacket instead of angularly displacing it.

Charging and Discharging Gas-Retorts and the Like.

M'Caskill, M., and Donaldson, J., of Tonbridge.

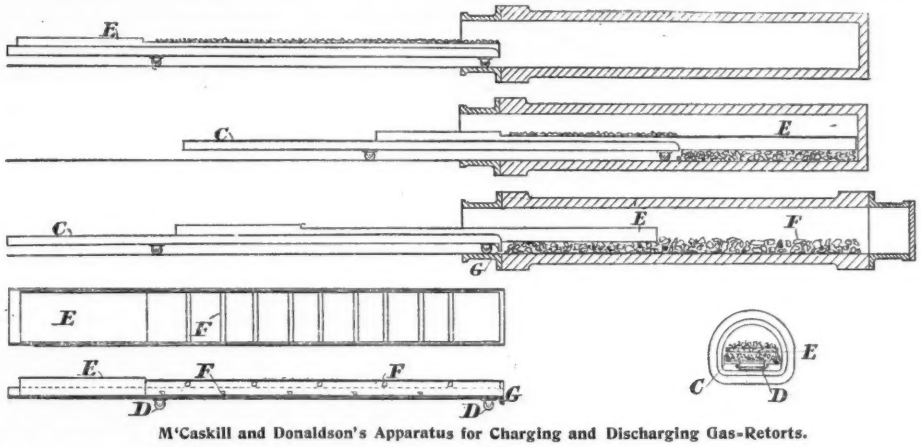
No. 14,320; June 22, 1906.

This invention relates to charging and discharging apparatus in which a rake is employed for single-ended retorts and the fresh charge of coal is deposited by the relative motion of the two parts of the conveying apparatus.

The illustration gives (1) a sectional view of the retort and an elevation of the apparatus employed for charging it; (2) a sectional view of retort showing it partly charged; (3) a further stage in the process of charging; (4) a plan of the sliding baffle-plates; (5) the channel plate fitted with rollers, and the sliding frame and baffle-plates in section; (6) a cross section of the retort and the charging apparatus.

The charging apparatus consists of a channelled plate C, formed preferably from wrought iron or steel and fitted with rollers D. E is a metallic frame so formed as to slide easily within the channelled plate and divided into a series of partitions by transverse baffle-plates F. To charge the retort, the apparatus is filled with coal; then raised, lifted, or lowered by any suitable means and run into the retort—the part E being held fast during the operation of withdrawing. The baffle-plates F prevent the coal from drawing back during this operation; and "it falls in an even layer on the retort." When the apparatus described is employed for discharging the coke, the retorts must, of course, be open at both ends; and as the coal is being charged at one end, the coke is pushed out at the other by the push-plate G.

The patentees wish it understood that they "lay no general claim to



M'Caskill and Donaldson's Apparatus for Charging and Discharging Gas-Retorts.

apparatus employed for charging and discharging gas-retorts mounted upon a travelling car, in which rakes operated by mechanical means are employed." But they do claim: (1) In apparatus for charging single-ended gas-retorts the combination and use of a channelled plate fitted with rollers and having an inner frame formed with baffles and sliding therein in the way and manner described. (2) In apparatus for charging and discharging gas-retorts the front and back ends of which are capable of being opened and suitably closed, the combination and use of a channelled plate fitted with rollers, guides, or the like, and a depending push-plate, with an inner frame formed with baffles and sliding therein—the respective parts co-operating for the purposes specified.

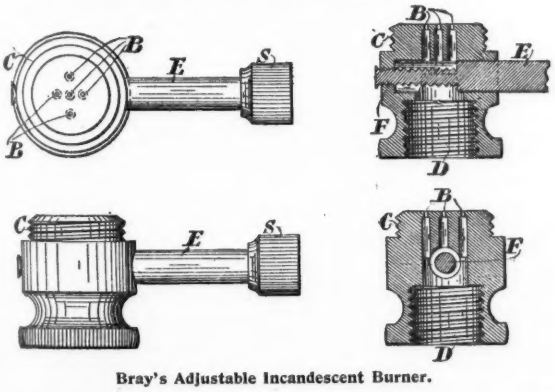
Adjusting the Gas Supply to Incandescent Burners.

Bray, J. W., of Leeds.

No. 16,766; July 25, 1906.

This invention consists in an improved form of adjusting screw and nipple on the principle of patent, No. 15,729 of 1903, granted to the late Mr. George Bray and the present applicant.

The gas-nipple is provided with more than one aperture for the emission of the gas into a bunsen tube or mixing-chamber—such nipple being adapted to fit any of the "Bray" incandescent gas lighting burners, whether vertical or inverted, and also other atmospheric burners. It is provided with a combined screw and plug, whereby one or more apertures in it may be closed or opened at will, in order that the gas supply to the burner proper may be decreased or increased without interfering with the pressure at the nipple.



Bray's Adjustable Incandescent Burner.

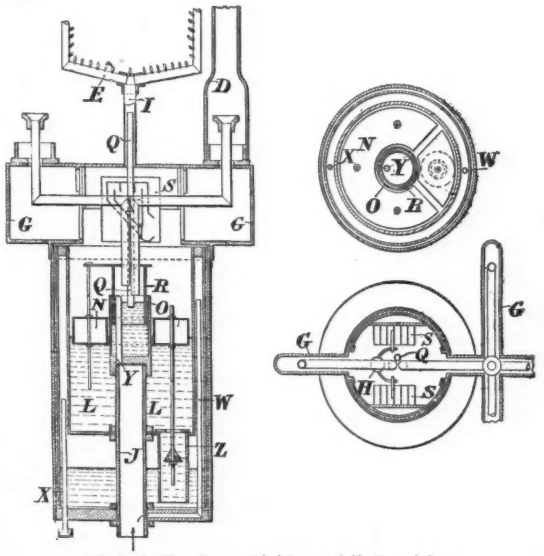
As shown, the nipple is provided with a threaded aperture D for the gas-pipe or adapter; and an externally threaded portion C for the bunsen tube or mixing-chamber. A number of holes B are formed in the nipple, as described in the earlier patent. Although five holes are shown, there may be any other number—five being the number which, for ordinary burners, has been found by experiment to give most satisfactory results. The adjusting screw is formed in one piece, comprising a head S and a barrel E of larger diameter than the screw F. Above the aperture D is formed a slightly smaller aperture leading to the under face of the nipple, through which the apertures B are formed; the under face forming, as it were, the centre line of the adjusting screw. In one side of the nipple. and in a line intersecting three of the holes B, is drilled an aperture across the interior under face of the nipple—thus forming a semi-circular channel in the under-face of the nipple, and a round hole in one side of it. In the opposite side of the nipple (still in alignment with the aperture) is drilled and tapped an aperture of diameter equal to the screw F. The adjusting screw is inserted in these apertures, and the projecting end of the screw F slightly turned over, if required, to prevent its withdrawal. Thus when the screw is in the open position, the gas passes around the screw F and through all the apertures B; while a movement of the screw causes the barrel E to pass over first one aperture B and then another until all three are closed—the gas being still free to pass through the other two holes. By this means the required adjustment is made.

Lighting and Extinguishing Gas-Lamps.

Hinden, A., of Neustadt-on-the-Haardt, Germany.

No. 17,240; July 31, 1906.

This is a modification of the arrangement described in patent No. 7003 of 1905; the apparatus being so arranged as to be applicable not only to a single igniting and main flame, but also to several main flames.



Hinden's Gas-Lamp Lighter and Extinguisher.

For this purpose, the bell-float previously described is provided with several gas supply pipes, leading to the main burners, the openings of which pipes are at different levels. With the bell-float of the previous

patent, it was necessary, on account of its large sectional area and the consequent great upward pressure of the gas, to add a considerable weight to the bell, in order to cause it to sink when the greatest evening gas pressure occurs. This weighting of the bell, however, interferes with the sensitive action of the apparatus; and another of the present improvements consists in an arrangement by which any special loading of the bell-float is rendered unnecessary. For this purpose, the bell is made with a comparatively small sectional area, so that the upward pressure of the gas is reduced to such an extent that the parts arranged on the top of the bell suffice to cause it to sink even with the greatest night pressure. In order, however, notwithstanding the small upward pressure of the gas, that the raising of the bell for the purpose of the ignition may be reliably effected, there is combined with the bell-float a special float carried by a water level, which is made to rise under the influence of the entering gas.

With the bell-float R are combined two pipes, the lower openings of which are at different levels, and are also above the opening of the igniting pipe Q, which leads to the igniting burner E, provided with climbing igniting flames. The pipes lead to the main burners D, and can be further branched if required. In the top of the casing G, enclosing the pipes and the bell-float, is arranged the fixed switching device S, within the cells of which the float R is guided by the holding arms described in the former specification. The igniting pipe Q is led centrally upwards and moves freely in the larger pipe I; ignition being effected by means of a heated platinum wire.

When, by increasing the gas pressure, the bell-float has been raised to such an extent that the igniting pipe rises out of the liquid, all the main flames will be ignited, as all the pipes will be above the liquid. If the gas pressure be now reduced again, the holding arm connected to the bell-float will sink into the cell of the switch device as it is pressed over to the left hand by the counterweight H. If, at midnight, or at any other desired time, a portion of the lamps are to be extinguished, the gas pressure is again raised and then reduced again. By this means the holder arm descends into the cell situated at about half the height of the switch device, whereby the opening of one of the pipes will be made to descend into the liquid and only the opening of the other pipe will remain uncovered for the supply of gas.

The bell-float R is made comparatively small and floats in mercury. Surrounding the vessel O is a larger vessel charged with unfreezable liquid, in which is a float N connected to the bell-float by means of three rods. Surrounding the vessel is a double-walled vessel, the narrow space between the walls communicating at the bottom with the interior one. The liquid level in all three vessels is regulated by means of the overflow pipe X; while the inner vessel communicates with the outer one by means of the tubular extension Z. The supply of gas to the float R is effected through the pipe Y from the main supply pipe J. In addition, the gas passes from J, through the channel W, into the intermediate vessel, so that the pressure forces the liquid out through the tube Z into the inner vessel, and, in consequence, the liquid level rises in the space L, and the float N, in rising, assists the rising of the bell-float R. In order to prevent the liquid from rising too high in the space L, a further float is provided, having a rod carrying a valve, which, at a certain height of the float, closes the tube Z and prevents the further entrance of liquid, in the event of the pressure rising too high at the gas-works.

Street-Lamps.

RECH, F., of Bruhl, near Cologne.

No. 14,819; June 30, 1906.

What this invention refers to will be appreciated from the engraving—a street-lamp with a stationary globe support, a stationary roof, stationary arms or posts for the roof, and a globe in halves or more parts; sufficient space being left in the roof for the upper edge of the globe to

Rech's Street-Lamp.

permit either part to be raised above the border of the globe support and be inclined outwards so as to be withdrawn for the purpose of cleaning.

The lamp has a globe support and two arms or posts of T-section, the ribs of which are placed inwardly, and rigidly connected with the globe support on the one hand, and with the roof on the other hand, so as to serve not only as supports of the roof, but also as guides for the globe halves. The roof has at the bottom an opening, the diameter of which is made larger than the globe, so as to permit the globe halves being inclined outwards; their upper corners being in contact with the ribs of the arms or posts, as shown. At the periphery of the opening the roof is provided with a border, to the inside of which several leaf springs are attached, for pressing on the globe halves. The latter are therefore pressed on the ribs of the arm or posts, so that no spaces are left between them. It will be seen that either globe half can be shifted upwards by hand until its lower edge is raised above the border of the globe support; then it is inclined or turned outwards; next lowered along the arms or posts; and removed for the purpose of cleaning.

It is claimed that the lamp described presents, besides the advantages mentioned, also the advantage, that when only one globe half is taken off, the other half will remain secure, both above and below, and will protect the mantle from damages by wind puffs. This advantage is said not to be found with any other lamp provided with a globe in several parts and devices for raising and lowering them.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by Correspondents.*]

Manchester University and the Leeds Professorship for Fuel.

SIR,—I have every sympathy with the proposal that the gas profession should give financial aid to research work in connection with the burning of gases; and I know no place which gives promise of more fruitful work in this direction than the new Laboratory at Leeds, designed by my friend and former pupil and colleague, Dr. Bone. I sincerely hope the scheme suggested by Sir George Livesey and Professor Smithells may be consummated.

But there have been expressions used in this discussion that might lead to the inference—which I am sure Professor Smithells did not wish to be drawn—that, because the Manchester University (more familiarly, "Owens College") has lost the services of Dr. Bone, we have relinquished research work on gases and gaseous fuel. That this is not the case will be apparent when I state that, under our new Professor of Metallurgy, two rooms are reserved in the Metallurgical and Fuel Department for work on gases and gaseous fuel; and in the Chemical Laboratories six rooms are now being used for original investigations on gases, which include researches (i.) on the ignition point of gases, (ii.) on the rates of explosion of hydrocarbons, (iii.) on the effect of dryness on the burning of gases, and (iv.) on the specific heat of gases at high temperatures. We are also experimenting on flexible joints for iron gas-mains.

We, in Manchester, are proud of Dr. Bone's promotion, and wish him every success in his new sphere; but we are not without hope that some present or future student here may follow in the footsteps of those old Owens students, Professors Smithells and Bone, who have won such distinction by their researches on that most fascinating of chemical problems—flame.

The University, Manchester, Nov. 24, 1906. HAROLD B. DIXON.

Mr. James Paterson's Paper on "Big Makes."

SIR,—Allow me to congratulate Mr. James Paterson (worthy son, let us hope, of two worthy sires—sire and grandsire) on his charmingly "inconsequential" paper, read at the last meeting of the Southern Association on "Big Makes per Ton." The excellent discussion that it elicited—not to mention your editorial remarks—may well encourage other aspirants to take up similar questions, if for no other reason than to "draw" opinions and experiences of older members of the profession.

To do this, however, requires nearly as much courage as to present a paper recounting one's failures.

There are some allied subjects which I would like to see treated sympathetically; and I would recommend them to some one gifted with a modicum of humour, and thirsting to flesh his maiden sword—viz., "The Disadvantages of Modern Improvements in Gas-Works," "The Fallacy involved in Striving After a Reduced Leakage," and "Why Worry with the Welsbach when you have the Flat-Flame Burner?" I would take them in hand if I dared to risk what reputation I may have gained in two-thirds of a lifetime. But there are those who might *build* a reputation on their adequate treatment.

Manchester, Nov. 21, 1906. THOMAS NEWBIGGING.

The Disposal of Ammoniacal Liquor by Small Works.

SIR,—I wish to ventilate the difficulty we have in getting rid of our ammonia water, and hope to attract the attention of gas managers, who are similarly situated, and who may have overcome the difficulty, without going to the expense of putting in a sulphate plant.

The works are only small (8¼ millions); and the ammonia water is at present run off into a drain connected to the town sewer. The sewer has its outlet in the harbour; and as the tide comes in, it blocks up the mouth of the sewer, thus preventing the escape of the ammonia water, which then appears to percolate through the gulley-traps in the streets, and those connected to house drains—the pungent odour causing great annoyance to the people in the neighbourhood, whose houses are joined on to this particular sewer.

Only quite recently, we have spent a large sum in improving and extending our works, and consequently do not feel disposed, just at present, to embark on a fresh outlay on a sulphate plant.

We are thinking of erecting a ventilating shaft on the sewer; and in case this should fail to act, we might lay down a separate drain, independent of the town sewer.

I would be glad to receive, through your columns, suggestions on the subject from members of the gas industry and profession.

Nov. 23, 1906. GAS MANAGER.

PARLIAMENTARY INTELLIGENCE.

NOTICES GIVEN FOR BILLS (SESSION 1907) RELATING TO GAS AND WATER SUPPLY.

The following are among the notices which have been given for Bills to be promoted next session in connection with the supply of gas and water.

Gas Companies (Removal of Sulphur Restrictions).—Application will be made for leave to promote a Bill to remove the existing statutory provisions or restrictions as to quantity of, and liability for excess of, sulphur compounds (other than sulphuretted hydrogen) contained in gas supplied by the Bath, Blyth and Cowpen, Eastbourne, Scarborough, Tynemouth, West Ham, and Weymouth Consumers' Gas Companies; and for this purpose to repeal, so far as may be necessary, the following Acts, and any other relating to these Companies: Bath Gas Act, 1875; Blyth and Cowpen Gas Act, 1887; Eastbourne Gas Act, 1868; Scarborough Gas Act, 1895; Tynemouth Gas Act, 1897; West Ham Gas Act, 1889; and Weymouth Consumers' Gas Act, 1867.

Annfield Plain and District Gas.—Application will be made for the incorporation of a Company to supply gas within the urban district of Annfield Plain, Tanfield, Leadgate, and the parish of Medomsley, in the county of Durham. Authority will be sought to enter into and carry into effect contracts and arrangements with William Albert Schultz and Charles Comins, or the owners for the time being of the gas-works at Kyo and Dipton, in the urban district of Annfield Plain, in regard to the purchase and acquisition of all or part of their existing undertakings for the supply of gas, including all or some portion of certain lands specified; and also with Sir James Joicey, Bart., or the owner or owners of any other gas-works, mains, or pipes in the urban districts of Tanfield and Annfield Plain, in regard to their purchase. Power will be sought to maintain and use, as part of the Company's undertaking, the existing works, or some of them, when purchased or acquired, as well as to manufacture and supply gas for domestic, trading, public, and other purposes, and to levy rates and charges therefor. The Bill to be promoted will contain provisions in respect of the capital and borrowing powers of the Company, the raising of additional money, the issue of debenture stock and other securities, the adoption of a sliding-scale of price and dividend, the creation of reserve, insurance, and renewal funds, the supply of gas in bulk, and other matters.

Ashton-under-Lyne District Water.—The Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water-Works Joint Committee intend to apply for an extension of the time limited by their Act of 1870 (as amended by subsequent Acts) for the completion of such of the works authorized by that Act as have not yet been finished, and also for further powers. The Bill to be promoted will contain provisions for securing the purity of the water, for increasing the contributions of the authorities constituting the Committee, and for enabling them to raise more money. The various existing Acts are to be amended or repealed.

Basingstoke Gas.—The Basingstoke Gas Company will apply for authority to consolidate and convert their capital, and raise more by auction or tender, construct additional works, and store gas on lands described. It is proposed to adopt a sliding-scale of price and dividends, and to repeal, alter, and vary all or some of the provisions of the Company's Act of 1887 with respect to the quality, pressure, and testing of gas, and provide for the reduction of the quality. The other matters to be dealt with by the Bill to be promoted are of the usual character.

Birmingham Corporation Water.—The Birmingham Corporation will apply for power to amend the financial provisions of their Water Acts of 1892 and 1902, and postpone the date for commencing the repayment of the loans raised under these Acts.

Brighouse Corporation.—The Brighouse Corporation will make application for further powers in regard to their electricity undertaking, and the Bill to be promoted with this object will contain a provision enabling them to refuse to supply either gas or electrical energy to persons who are in their debt.

Brockenhurst Gas.—Application will be made for the incorporation of a Company to acquire, construct, and maintain gas-works; to manufacture and supply gas within the parish of Brockenhurst, in the county of Southampton; and to raise the necessary capital. The usual powers will be sought to levy rates and charges, impose meter-rents, manufacture and supply ordinary and slot meters, stoves, fittings, &c., and sell gas in bulk.

Coventry Water.—Application will be made by the Coventry Corporation for authority to construct and maintain a line or lines of pipes commencing in the parish of Shustoke, in the county of Warwick, by a junction with an existing pipe belonging to the Birmingham Corporation, and terminating in the city of Coventry. The proposed pipe-line will pass through some of the following parishes: Maxstoke, Great Packington, Meriden, Allesley, and Coundon Hamlet. The Corporation also wish to construct a service tank wholly in Coventry, adjoining the southern of the two existing service reservoirs. Power will be sought for the Corporation to enter into agreements with the Birmingham Corporation for the supply of water by them, and for the confirmation of any agreements entered into prior to the passing of the Act for which application is to be made. The Corporation wish to have conferred upon them the right of demanding a supply of water under section 62 of the Birmingham Corporation Water Act, 1892, as if they were an authority, as defined by that section, in the county of Warwick within 15 miles of the aqueduct therein referred to. The Bill to be promoted will contain provisions for securing the purity of the water and its adequate supply, the levying of rates and charges, and the raising of the necessary money for the purposes of the Act.

Falmouth Gas.—The Falmouth Gas Company will apply for power to raise additional capital by auction or tender, and to make provisions with respect thereto, as well as to the formation of reserve and insurance funds. Authority will be sought to construct works on lands indicated and to purchase others, by agreement. It is proposed to repeal, alter, and vary the provisions of the Company's Act of 1890 relating to the testing of gas and the apparatus to be used for the purposes. The other matters to be included in the Bill to be promoted will be of the usual character.

Grays and Tilbury Gas.—The Grays and Tilbury Gas Company, Limited, desire to be dissolved and re-incorporated. The existing capital is to be regulated and converted, and more will be applied for. Power will be sought to maintain and extend the works, purchase lands, and supply gas in the parishes of Grays Thurrock, West and Little Thurrock, West and East Tilbury, and other places in the county of Essex. The Bill will contain the usual provisions applicable to gas companies, including power to apply for a Provisional Order or Licence for the supply of electrical energy for public and private purposes.

Great Yarmouth Water and Lowestoft Water and Gas.—Power will be sought by the Great Yarmouth Water Company and the Lowestoft Water and Gas Company to abstract water from the River Bure, and construct additional water-works, consisting of an intake in the parish of Horning, a line or lines of pipe, a pumping-station, a subsiding reservoir in the parish of Ormesby St. Michael, and a pipe-line connecting it with the Ormesby pumping-station of the Yarmouth Company. It is proposed to prohibit the mooring of vessels near the point of intake on the Bure; and provision will be made for the protection of the water from fouling. Power will be asked for the Lowestoft Company to supply water-meters and also gas in bulk; and for the two Companies to supply water in bulk, and to enter into agreements with each other. Additional capital will be required.

Heywood and Middleton Water Board.—The Heywood and Middleton Water Board will apply for power to purchase or acquire by agreement certain lands for the purposes of their water undertaking, and also for an extension of the time limited by the Heywood Water-Works' Act, 1877, as amended by the Act of 1901, for the completion of the catchwater, conduit, and other works thereby authorized. It is proposed to alter the securities in respect of certain stock of the Heywood Corporation, and transfer to the Board the liability thereunder. Further powers are required in regard to the supply of water, meters, and fittings, and the borrowing of money.

Keswick Water.—The Keswick Urban District Council will seek authority to maintain and continue the existing water-works, construct others, and supply water within certain defined limits. In the Bill to be promoted, provision will be made for preventing waste, testing fittings, levying charges for water, and borrowing money on the security of the rates.

King's Norton and Northfield Urban District Council.—In a General Bill to be promoted by the King's Norton and Northfield Urban District Council, a clause will be inserted to enable them to provide within their district a place or places furnished with the necessary apparatus for testing the gas supplied, and to give to the tests made there the same value as those carried out at the official testing-place in Birmingham or elsewhere.

Leeds Corporation.—Authority will be sought by the Leeds Corporation to abandon certain works authorized by their Act of 1901—including the Colsterdale reservoir, a portion of an aqueduct, a line of pipes, and some road diversions—and to carry out a number of others, consisting of three reservoirs, several conduits or pipe-lines, and a road diversion. Application will be made for an extension of the time specified in the above-named Act for the completion of the works therein authorized. In the Bill to be applied for, provisions will be inserted in regard to the temporary supply of water from the Pott Beck and the River Burn, pending the completion of the Leighton reservoir, and the new Colsterdale reservoir; the laying of mains within and beyond the city; and the amendment of the Harrogate Water-Works Tramroads Act, 1904, and the Leeds Corporation (Water-Works) Act, 1904, as to tramroads and railroads, and the purchase of lands and easements relating thereto. Additional money powers will be required.

Llandrindod Wells Gas.—Application will be made for the incorporation of a Company for supplying gas within the urban district of Llandrindod Wells and the adjoining parishes. The necessary powers will be sought to construct works, purchase lands and easements compulsorily, levy rates and charges, &c.; and the Bill will contain the usual provisions in regard to the supply and consumption of gas, in the ordinary way or in bulk, the raising of the capital, the dividend to be paid thereon, the price of gas, and other matters incidental to the objects of the intended Act.

Maidstone Gas.—The Maidstone Gas Company will apply for power to extend their limits of supply so as to include various neighbouring parishes in the county of Kent, and to charge for gas such price as they may fix. It is proposed to alter the provisions of their Acts of 1858 to 1893 with respect to the quality of gas, to seek relief from their existing obligations with respect to the removal of sulphur compounds other than sulphuretted hydrogen, to amend their Acts so far as they relate to the testing of the illuminating power of the gas, and to provide for supplying free of charge to consumers who may require them "flat-flame burners most suitable for the proper consumption of gas of the illuminating power or quality proposed to be supplied." Provision will be made in the Bill for the formation of a renewal fund, for the construction and working of a tramroad connecting the Company's works with the South-Eastern and Chatham Railway, and for laying down pipes for disposing of oil and liquids and for other ancillary purposes.

Metropolitan Water Board.—Application will be made by the Board for various powers, including the construction of a tunnel under the Thames at Twickenham for their mains, twelve conduits or pipe-lines, and a reservoir in the parish of Croydon. It is proposed to revive and continue the powers in regard to, and extend the time for

the construction and completion of, the pumping-station in the parish of Walton-on-Thames and an aqueduct, conduit, or line of pipes authorized by the Southwark and Vauxhall Water Act, 1898; and also to extend the time limited by the Lambeth Water-Works Act, 1900, for the construction of the reservoir and the second aqueduct, conduit, or line of pipes authorized by that Act, and for carrying out the ancillary works in connection with them. The Bill to be promoted will consolidate the powers of the Board in regard to taking water from the Thames, and it will contain provisions to enable the Board to use throughout their district water allocated to a particular part, as well as others bearing upon the liability incurred in certain cases for payment of water-rates, and as to the obligations and powers of the Board, and the supply of water beyond the Board's limits. Other provisions will relate to the ownership of communication-pipes and the capacity of baths, the lending of money temporarily, the raising of money, and other financial matters.

Metropolitan Water Board (Charges, &c.).—The Metropolitan Water Board will apply for permission to introduce a Bill to provide for uniform scales of charges for water, determine the basis of assessment of premises for water-rate, make owners of tenements supplied by one communication-pipe liable for the payment of the rate, and extend the Water-Rate Definition Act, 1885, and the Water Companies (Regulation of Powers) Act, 1887. The Board desire to make such provision as may be found necessary or expedient for continuing their power to issue precepts to the authorities mentioned in section 15 of the Metropolis Water Act, 1902, for the payment of sums required to meet deficiencies in the water fund. The Bill will contain a number of miscellaneous provisions in regard to the supply and charge for water.

Mitcham and Wimbledon Gas.—Application will be made by the Mitcham and Wimbledon District Gas Company for authority to consolidate and convert their existing capital and raise more, to purchase certain lands, construct works, &c. It is proposed to alter the provisions of the Order of 1892, relating to the illuminating power of the gas, and to provide for its reduction; also to make other provisions with respect to the quality and testing of the gas, and the apparatus to be used for the purpose. Section 52 of the Company's Act of 1867 is to be repealed, so as to allow of the introduction of the principle of the sliding-scale; and the price to be charged for gas supplied through prepayment meters, as well as for these meters and the fittings used with them, is to be fixed and regulated. The other provisions in the Bill to be promoted will relate to the determination of the remuneration of the Secretary by the Directors, the laying down of pipes in roads not dedicated to public use, the sale and hire of fittings, &c., the supply of gas in bulk, and the recovery of demands in the County Court.

Ogmore and Garw Water.—The Urban District Council of Ogmore and Garw, in the county of Glamorgan, will apply for authority (*inter alia*) to purchase the water undertaking of the Ogmore Gas and Water Company, Limited, and the water-works and mains at Gilfach Goch belonging, or reputed to belong, to Christmas Evans and others. Any agreements entered into by the Council with the last-named parties are to be confirmed. Authority will be sought to maintain and continue the required works, construct others, and supply water in the whole of the urban district, with the exception of the portion comprised within the limits of the Garw Water Company now supplied by them under the provisions of their Act of 1889. The new works proposed are a reservoir to be situated in the parishes of Llangeinor and Llandyfodwg, in the urban district of Ogmore and Garw, another to be located entirely in the latter parish, two aqueducts or pipe-lines, an embankment, and a road diversion in connection with it. The Bill to be promoted will contain the usual provisions in regard to the protection of the works and water, the prevention of waste, the sale of water in bulk, the supply of meters and fittings, &c. The necessary money powers will be applied for.

Portishead Water.—The Portishead District Water Company intend to apply for power to construct new works, consisting of a pumping-station in the urban district of Portishead, and a line of pipes to connect it with a covered service reservoir to be built in the parish of North Weston. The Bill to be promoted will contain the usual provisions for the protection of the water and the detection and prevention of waste, the supply and fixing of meters and fittings, &c. The term "domestic supply of water" is to be defined. Additional capital will be required.

Shanklin Gas.—The Shanklin Gas Company, Limited, desire to be dissolved and re-incorporated, with power to maintain and extend their works, and supply gas in the urban district of Shanklin and neighbouring parishes in the Isle of Wight. The present capital is to be regulated, and more will be applied for. The Bill to be promoted will contain provisions in regard to the manufacture and supply of meters, fittings, &c., the illuminating power of the gas, the adoption of a sliding-scale of price and dividend, the supply of gas on the prepayment system and in bulk, and the creation of renewal, reserve, and insurance funds. Authority will be sought to make application for a Provisional Order or Licence to supply electrical energy.

Sheffield Corporation.—The Sheffield Corporation will seek power to construct water-works, consisting of two aqueducts, conduits, or pipe-lines, both in the West Riding of the county of York; to alter and reduce, and if thought fit to abolish, the charges for baths and water-closets; to effect agreements with mill-owners on the Rivers Rivelin, Loxley, or Don in regard to compensation water; and to provide for the reduction of the quantity to be discharged into the River Porter or Little Don, as well as into the Don, and the method of its discharge. Authority will be sought to raise more money.

Southend Water.—The Southend Water Company will apply for authority to extend their limits of supply so as to include a number of parishes and places in the county of Essex, and to purchase by agreement the water undertakings of the Leigh-on-Sea Urban District Council and the Billericay Rural District Council. It is proposed to repeal so much of section 5 of the Rochford, Rayleigh, and Leigh Water Order of 1891, as relates to the inclusion of a portion of the parish of Leigh lying within the limits of supply defined by that Order. Additional capital will be required.

South Lincolnshire Water.—Application will be made by the South Lincolnshire Water Company for further powers and an extension of their limits of supply so as to include the urban district of Bourne and several parishes in the county of Lincoln. Authority will be sought for the purchase of the undertaking of the South Lincolnshire (Fen) Water Company. In the Bill to be promoted, the Company will ask for power to make bye-laws for the prevention of waste, and to require that every borehole or artesian well within their area shall be sunk "with due regard to the supply of water to the inhabitants of the district by the Company or otherwise," and that all such boreholes and wells shall be "constructed in a water-tight manner, free from outside leakage, and properly sealed by taps or otherwise so as to prevent undue waste of water." It is proposed to repeal, so far as may be necessary or expedient, the provisions of the South Lincolnshire Water Act, 1906; and to alter or amend the Spalding Water Act, 1900, by excluding from the limits of supply defined by it the parishes of Bourne, Deeping, St. Nicholas, and Pinchbeck. Additional capital will be required.

Southport, Birkdale, and West Lancashire Water Board.—Application will be made by the Board for a Bill to empower the Skelmersdale Urban District Council to sell their Scarth Hill water undertaking to them, with all the rights, powers, and privileges appertaining thereto. The Board's limits are to be extended so as to include the district of the Council, who are to be supplied with water in bulk. Provision will be made for the Council to become a constituent authority of the Board. Power will be sought for the purchase of the mains, pipes, and fittings of the West Lancashire Rural District Council now used for the supply of Bickerstaffe. Borrowing powers will be required.

St. Neots Urban District Council.—Authority will be sought by the St. Neots Urban District Council to purchase the undertaking of the St. Neots Water Company, and to maintain, continue, and improve the existing works. The Council will ask for further powers with regard to the supply of water, meters, and fittings, the prevention of waste, and the levying of rates and charges. Additional capital will be required.

Tees Valley Water (Consolidation).—The Tees Valley Water Board intend to apply for the consolidation, with amendments, and repeal of the several Acts and Provisional Orders relating to them; and also for authority, notwithstanding such repeal, to complete the Grassholm reservoir and certain conduits. The Board wish for power to increase, either temporarily or permanently, the quantity of water they may abstract from the River Tees at Broken Scar; and to have the provisions in regard to the discharge of compensation water into the Rivers Lime and Balder altered, and those relating to the regulation of it by the Darlington Corporation and others discontinued. It is proposed to include in the Board's limits the area reclaimed or reclaimable from the River Tees and its estuary now forming part of certain parishes in the North Riding of York and in the county of Durham. Other provisions in the Bill to be promoted will relate to the supply of water in bulk, define the terms upon which it is to be sold to large consumers, authorize the sale of meters, fittings, &c., and alter the existing borrowing powers of the Corporations of Stockton, Middlesbrough, and Thornaby.

Tynemouth Water.—The Corporation of Tynemouth intend to apply for an extension of their area of water supply, so as to include a number of parishes in the county of Northumberland, and also for power to construct additional works, consisting of four reservoirs (two covered) and six pipe-lines in connection with them. The Bill to be promoted will contain special provisions in regard to the supply of water in bulk to local authorities in the added area, the terms on which such supply will be afforded, and as to the supply and distribution of water. Further borrowing powers will be sought.

Wisbech Water.—Authority will be sought by the Wisbech Water Company for the construction of an aqueduct, conduit, or pipe-line in the parishes of Markham and Fincham, and passing through others in the county of Norfolk, to extend their area so as to include a number of places in that county and in the Isle of Ely, and exercise their powers therein; and to enter into agreements for affording a supply of water beyond the limits. Additional capital will be required.

Worthing Gas.—The Worthing Gas Company will apply for power to acquire lands in the parish of Goring, in the county of Sussex, and use them for the purposes of the manufacture and storage of gas; also to extend their limits of supply to the parishes of Goring and Durrington. The present capital is to be consolidated and converted, and more will be applied for. This is to be sold by auction or tender, and shares or stock may be issued to the consumers or employees of the Company. The Bill to be promoted will contain special provisions in regard to the sale or hire of gas-engines, dynamos, &c., the supply of gas outside the limits, the declaration of interim dividends, the qualification of Directors, and other matters.

THE GOVERNMENT AND ELECTRICITY SUPPLY.

A Bill to amend the Acts relating to electric lighting was introduced into the House of Commons a few days ago by Mr. Kearley, supported by Mr. Lloyd-George, the President of the Board of Trade; and it has since been printed. It consists of 17 clauses, of which the following is an epitome.

Clause 1 gives powers for the compulsory acquisition of land for generating stations; and it sets forth that the Board of Trade may by Provisional Order authorize any local authority, company, or person, who are authorized by the same or any previous Provisional Order or by Act of Parliament to supply electricity in any area, to acquire compulsorily or to use for the purpose of a generating station any land specified in the Order, whether situated within or beyond the area of supply; and in the case of a local authority, whether situated within or outside their district.

Clause 2 relates to the breaking up of streets outside the area; and

clause 3 deals with the supply of electricity in bulk. This clause runs as follows:

> The Board of Trade, unless they are of opinion that, by reason of the character or magnitude of the proposed undertaking, the matter ought to be dealt with by Private Bill, may by Provisional Order (*a*) authorize any company or person to supply electricity in bulk to any local authority, company, or person authorized to supply electricity in any area for the purpose of distribution by that local authority, company, or person within that area; (*b*) provide for any supply so authorized being compulsory; (*c*) authorize any local authority to supply electricity in bulk to any other local authority; (*d*) define what are to be the limits of supply for the purpose of the provisions of the Gas-Works Clauses Act, 1847, incorporated in the Electric Lighting Act, 1882, in the case of a local authority, company, or person so supplying electricity in bulk; and (*e*) make such other provisions as appear to them necessary for adapting the Electric Lighting Acts to any case where a local authority, company, or person are authorized to supply electricity in bulk.

Clause 4 provides for the supply of electricity to railways and tramways partly outside the area of supply; clause 5 makes certain provisions respecting the right of local authorities to purchase electric undertakings of which the generating stations, works, &c., are outside the local authorities' areas; clause 6 relates to the exercise of electric lighting powers by local authorities jointly; clause 8 substitutes five years for seven years as the ordinary period of revision of maximum prices to be charged for electricity; and clause 9 amends the schedule relating to the certification of meters in the Electric Lighting (Clauses) Act, 1899.

The next three clauses relate to the making up of the accounts of local authorities, restricting the transfer of powers, &c., of undertakers, and furnishing electricity to premises having a separate supply. Clause 13 relates to the construction of provisions prohibiting association among producers of electricity. For removing doubts, it is declared that so much of any Provisional Order or Special Act, or of the schedule to the Electric Lighting (Clauses) Act, 1899, as incorporated with any such Order or Act, as prohibits undertakers from associating themselves with any company or person supplying energy any Licence, Provisional Order, or Special Act, unless the undertakers are authorized by Parliament to do so, is not to be construed as prohibiting the undertakers from taking a supply in bulk from any company or person authorized to furnish it. Clause 14 provides that the Board of Trade are not by Provisional Order to authorize the compulsory acquisition of any land which, at the date of the first publication of the notice for the Order, belongs to, and is used by, any gas suppliers for the purposes of their undertaking.

The remaining clauses define the expressions used, provide for the application of the Act to Scotland, and specify the date on which it is proposed to bring it into operation.

GAS AND WATER PROVISIONAL ORDERS FOR 1906.

The Board of Trade have issued their report on their proceedings under the Gas and Water Works Facilities Act, 1870, in the first session of the present year. It shows that in December, 1905, 23 applications were made to the Board for Provisional Orders; 13 relating to gas and 10 to water undertakings. The amount of capital proposed to be authorized was £385,800 by shares and £108,862 by loan, of which £177,800 share and £54,364 loan capital was for gas, and £208,000 share and £54,498 loan for water purposes. The Gas Orders related to Charing and District, Chichester, Corsham, Farnham, Great Grimsby, King's Lynn, Newport Pagnell, Pontardulais, Raunds, Redditch, St. Austell, Wath-upon-Dearne and District, and Wollaston; and the Water Orders to Bolsover, Great Grimsby, Herne Bay, Hoylake and West Kirby, Maidstone, Mid-Kent, Poole, Rickmansworth and Uxbridge Valley, Sleaford, and Slough.

The principal objects of the application in regard to gas were as follows: To empower the Charing and District Gas-Works, Limited, to maintain and continue gas-works, and to manufacture and supply gas in the parishes of Charing, Lenham, and Harrietsham, in Kent. To empower the City of Chichester Gas Company to raise additional capital, and to make further provision as to the quality of gas supplied. To empower the Corsham Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas in the parishes of Corsham, Lacock, and Biddestone, in Wiltshire. To authorize the Great Grimsby Gas Company to extend their limits of supply. To empower the Farnham and King's Lynn Gas Companies to raise additional capital; and the Newport Pagnell Gas and Coke Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas. To authorize the Pontardulais Gas Company, Limited, to maintain and continue their existing gas-works, and to manufacture and supply gas within part of the parish of Llandeilo-Talybont, in the county of Glamorgan, and part of the parish of Llanedy, in the county of Carmarthen. To give the Raunds Gaslight and Coke Company, Limited, power to construct and maintain gas-works, and to supply gas in the parish and urban district of Raunds and the parish of Stanwick, in the rural district of Thrapston, in the county of Northampton. To empower the Redditch Gas Company to construct further works for the manufacture and storage of gas and to raise additional capital; the St. Austell Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas in certain parts of the county of Cornwall; the Wath-upon-Dearne and District Gas Company, Limited, to raise additional capital, borrow further moneys, and acquire additional land for the construction of gas-works; and the Wollaston Gas, Coal, and Coke Company, Limited, to maintain, continue, and improve their existing gas-works, and to manufacture and supply gas within part of the parish of Wollaston, and in the parishes of Strixton and Bozeat, in the county of Northampton. Six applications—viz., those from Chichester, Farnham, Great Grimsby, King's Lynn, Redditch, and Wath-upon-Dearne—were in respect of undertakings already authorized by Special Acts or Provisional Orders; the remaining seven (those from Charing, Corsham, Newport Pagnell, Pontardulais, Raunds, St. Austell, and Wollaston) were in respect of existing unauthorized undertakings.

Objections were lodged against the Charing, Corsham, Great Grimsby, Newport Pagnell, Pontardulais, and St. Austell applications; but in the case of the Charing, Great Grimsby, and St. Austell applications the opposition was withdrawn after negotiation between the promoters and the objectors. There was no opposition to the Chichester, Farnham, King's Lynn, Raunds, Redditch, Wath-upon-Dearne, and Wollaston applications. The objections were duly considered by the Board, and inquiries were held in such cases as appeared to be necessary. An Order was granted in each instance, subject to such modifications and amendments as seemed to be required. In the case of the Corsham Gas Order, it was decided, after an inquiry, to dispense with the consent of the Chippenham Rural District Council; and a special report was made to Parliament in the matter.

In the following Orders a maximum price of gas per 1000 cubic feet was prescribed; power being reserved to the Board of Trade, after three years, to alter the maximum price, or to substitute a standard price with sliding-scale: Corsham, 4s. 6d.; Newport Pagnell, 4s. 6d.; Raunds, 4s. 9d.; and Wollaston, 5s. A standard price per 1000 cubic feet, with sliding-scale as to profits, was fixed in the following Orders: Charing, 4s.; Pontardulais, 4s. 6d. (above 4s. 9d. for reduction of dividend, and below 4s. 6d. for increase of dividend); and St. Austell, 4s. 6d. (above this for reduction, and below 4s. 2d. for increase of dividend).

In the Charing, Corsham, Newport Pagnell, Pontardulais, Raunds, St. Austell, and Wollaston Orders, an illuminating power of 14 candles was prescribed. Clauses relating to the burner and other apparatus to be used for the testing of gas, in the amended form adopted in the case of Bills in Parliament during the present session, were inserted in each Order in which such provisions were requisite. A clause relating to the purchase of the undertaking by the Local Authority was inserted in the St. Austell Gas Order by agreement between the promoters and the St. Austell Urban District Council. A clause repealing the obligation of the Chichester Gas Company with regard to the purification of their gas from sulphur compounds other than sulphuretted hydrogen was inserted in their Order, also by agreement between the promoters and the Local Authority; and another providing for the forwarding to the Company of stock or share certificates in the case of transmission of shares or stock in consequence of the death, bankruptcy, or insolvency of any shareholder or stockholder. Agreed clauses were also inserted in various Orders for the protection of road authorities and others.

The principal objects of the applications for Water Orders were as follows: To empower the Bolsover and District Water Company, Limited, to raise additional capital, and to amend the scale of rates and charges prescribed by the Bolsover and District Water Order, 1903. To empower the Great Grimsby Water Company, Limited, to extend their area of supply; and the Hoylake and West Kirby Gas and Water Company, Limited, to construct additional water-works, and raise more capital. To authorize the Herne Bay, Mid-Kent, and Maidstone Water Companies to raise additional capital, and the Mid-Kent Company to extend their limits of supply. To empower the Poole Water Company to raise more capital, construct additional works, and extend their limits of supply. To enable the Rickmansworth and Uxbridge Valley Water Company to lay down an additional main, the Sleaford Water Company to construct and maintain a new reservoir and raise additional capital, and the Slough Water Company to obtain more money and extend their limits. All the applications were in respect of undertakings already authorized by Special Acts or Provisional Orders.

Objections were lodged against all the applications, with the exception of that by the Sleaford Water Company. In the case of the Great Grimsby application, the opposition was withdrawn after negotiations between the promoters and the objectors. The objections were duly considered by the Board of Trade, and inquiries were held in such cases as appeared to be necessary. An Order was granted in each instance, subject to such modifications and amendments as seemed to be required.

An inquiry was held at the office of the Board in respect of the application of the Mid-Kent Company. The promoters failed to produce the consents of some of the local and road authorities concerned, and asked the Board to dispense with them, by virtue of the powers conferred upon them under section 4 of the Gas and Water Works Facilities Act, 1870. Objections were also lodged by the Cranbrook and District Water Company against the inclusion in the limits of the Order of the parishes of Biddenden, Frittenden, and High Halden. These parishes are within the limits of the Cranbrook and District Water Company, authorized by that Company's Act of 1898, subject to a provision limiting, under certain circumstances, the exclusive right of the Company to supply water within those parishes to a period of three years from the passing of the Act. After careful consideration of the representations made as to the failure of the Cranbrook and District Water Company to supply water within the parishes in question, the Board came to the conclusion that it was desirable to include these parishes in the limits of the Order. They decided also to dispense with the consents of the Cranbrook and the Elham Rural District Councils, and the Stelling, Stalisfield, and Upper Hardres Parish Councils, and they made a special report to Parliament stating the grounds on which these consents had been dispensed with. The Board accordingly granted the Order applied for, subject to such amendments and modifications as they considered to be necessary.

The Rickmansworth and Uxbridge Valley and Slough applications were jointly the subject of an inquiry held at the office of the Board. The former application sought to authorize the promoters to lay a line of pipes to enable them to supply water within the parish of Fulmer and other places in the county of Bucks, which were included in the limits of supply authorized by the Rickmansworth and Uxbridge Valley Water Act, 1900. The latter application proposed (*inter alia*) to include those parishes in the limits of supply of the Slough Water-Works Company. It appeared at the inquiry that the Rickmansworth application was supported by the Buckinghamshire County Council and the Eton Rural District Council, with whom the promoters had agreed clauses; and, after careful consideration of the representations made to them, the Board decided to grant the application, and to strike out from the Draft Order deposited by the Slough Company so much as referred to the parishes of Fulmer, Hedgerley, and Hedgerley Dean. Objections

were also lodged against the Slough application by the Slough Urban District Council and others, and were duly considered; and the Board decided to grant an Order, subject to considerable modification and amendment.

Agreed clauses were inserted in various Orders for the protection of local authorities and others, with such amendments as the Board were advised to be necessary. In the Herne Bay Water Order, a clause was put in, by agreement with the Urban District Council, requiring the provision of a water-tower with the first money to be raised under the Order. In the Slough Water Order, a clause was inserted providing that after Jan. 1, 1909, the water-rates chargeable by the Company are to be calculated upon the rateable value. The same order contains a clause, inserted at the instance of the Office of Works, for the protection of the water supply of Windsor Castle. In the Rickmansworth and Uxbridge Valley Order, an agreed clause was inserted by which the Company were prohibited from taking more water from the county of Bucks than they brought into the county. This clause was struck out by the Committee of the House of Commons to which the confirming Bill was referred.

Five Bills were introduced to confirm the Orders granted by the Board—viz., the Water Provisional Order Bill, which was introduced in the House of Commons on the 2nd of May, and the Gas Orders Confirmation Bills (Nos. 1 and 2), the Water Orders Confirmation Bill, and the Gas and Water Orders Confirmation Bill, which were introduced in the House of Lords on the 3rd of May. The Water Provisional Order Bill, for the confirmation of the Poole Water Order, was passed in the House of Commons, but was subsequently withdrawn by the promoters by agreement with the Corporation of Poole on the passing of an Act promoted by the Corporation. The Confirmation Bills introduced in the House of Lords passed that House without opposition; but two Orders—the Mid-Kent Water and the Rickmansworth and Uxbridge Valley Water, both of which were scheduled to the Water Orders Confirmation Bill—were petitioned against in the House of Commons. The first-named Order was opposed by the Cranbrook and District Water Company, who wished to strike out so much of it as conferred power on the promoters to supply water in the parishes of Biddenden, Frittenden, and High Halden, and the petition was heard by a Select Committee; but the Order was passed without amendment. The Hertfordshire and Middlesex County Councils petitioned against the clause inserted in the Rickmansworth and Uxbridge Valley Water Order by agreement with the Buckinghamshire County Council; and the Select Committee decided to strike out the clause. No opposition was offered to the further stages of the Bills; and the four remaining Bills received the Royal Assent on the 4th of August.

LEGAL INTELLIGENCE.

A WATER-WORKS CONTRACTOR'S CLAIM.

At the Manchester Assizes last week, Mr. Justice Lawrence and a Special Jury were engaged in trying a case in which Mr. Abraham Kellett, a contractor, claimed from the Stockport Corporation a large sum of money for work done, and damages for breach of contract. The defendants denied their indebtedness, and also the breach of contract, and counterclaimed for breaches of contract on the plaintiff's part.

In opening the case for the plaintiff, Mr. Rufus Isaacs, K.C., M.P. (who appeared with Mr. Langdon, K.C., Mr. Norman Craig, and Mr. J. A. Spedding), explained that a contract was entered into by his client in November, 1902, with the Stockport Corporation for the construction of a masonry dam and reservoir and works incidental thereto in pursuance of a scheme for supplying the borough with water from the River Kinder. When the Corporation put an end to it, work had actually been done of the value of at least £75,000; and the Corporation had paid the plaintiff a sum of £68,154—10 per cent. of the amount due (£7572) being retained in hand by the Corporation under the terms of the contract. Through no fault of Mr. Kellett—indeed, there was no suggestion of any—circumstances had arisen which had led the Corporation to take up a position which, to say the least, was extraordinary as between persons doing business together and desirous of fair dealing. The contract represented a possible sum of £400,000; and Mr. Kellett made preparation for carrying it out. He brought materials on the ground, erected labourers' dwellings, laid down a railway, and did other things—all necessary in the case of a contract which would take seven years to fulfil. When the work had reached a certain stage, Mr. Kellett discovered, and called the Engineer's (Mr. James Mansergh's) attention to the fact, that the foundations were not satisfactory. There was a ledge of shale, which, in his judgment, would not sustain the masonry that was to be superimposed upon it. If, he said, the dam was to be constructed on that portion of the foundations which was insecure, it would affect the stability of the whole; and therefore he could not take any responsibility for it. Apparently the Engineer treated this warning with derision; but, while resenting Mr. Kellett's opinion, there could be no doubt that Mr. Mansergh was much more concerned about it than he admitted, for he concluded that some alteration was really necessary. At length, having kept Mr. Kellett at work for some fourteen or fifteen months, the Corporation gave him notice determining the contract. Not only so, but they said to the man who had helped them, and done nothing to hurt them: "We shall withhold from you the money we have in hand which belongs to you (£7500), and we shall claim from you repayment of the £68,150 you have already received from us." It was difficult to understand on what grounds such a claim could be put forward. The Corporation did not allege default. They said, in effect: "We find that we can make our reservoir on a different plan, and under a different contract—that is, by an earthwork dam, instead of masonry—which other Engineers advise us will be cheaper. We therefore rescind your contract." There was not a single allegation in the pleadings which in the slightest degree reflected on Mr. Kellett; and it was not alleged that he was unable to carry out the work as required. One head of plaintiff's claim was for over £16,000 for work done—apart from damages—which was not contemplated under the contract. The £7572 retention money the plaintiff was entitled to in any case. The defendants reserved the right to alter their scheme, within certain limits, as the Engineer might see fit; and after attention had been called to the instability of the foundations, they set Mr. Kellett to do a great deal of work of an unremunerative kind—knowing that the contract was to be determined—thus putting themselves in a better position with regard to the new contract which was contemplated. The first intimation as to the instability of the foundations was given by the plaintiff to the Resident Engineer (Mr. Madely), in 1905, when he said that he could take no responsibility for work done on such foundations. This led to correspondence; and Mr. Mansergh, writing to the Resident Engineer, said: "Clause 97 (of the contract) is quite clear. It throws the sole responsibility for the perfect stability and water-tightness of the dam on the Contractor; and you must say nothing to him which will lead him to suppose that his liability is limited in any way." It was refreshing, Counsel said, to find an Engineer, who was being paid heavy fees for preparing designs for the dam, throwing the sole responsibility for making it sound and water-tight on the Contractor. From that time till August, 1906, substantially the only work Mr. Kellett did, or was allowed to do, was to make a deep tongue trench at the base of the foundations; their object being, apparently, to gain information which would be of use to them in letting the contract for an earthwork dam. It did not redound to the credit of the Corporation that they should have taken advantage of their Contractor in this way. They ought in fairness to have told Mr. Kellet what was going on—that they were thinking of abandoning the scheme on which he was engaged—and not to have kept him employed on excavations which were, to him, profitless. In August, they served him with a notice which was really too clever. They wrote to him "that after careful investigation of the circumstances and consideration of the letters of the 2nd, 4th, and 15th of August, 1905, and the reports therein referred to, the Corporation are advised and believe that your objections to the dam for the Kinder reservoir, on the ground that the scheme cannot with safety be carried out, are well founded; and though the Corporation are well aware that they are entitled to call upon you to complete the construction of the dam in accordance with the terms of your contract, so as to be perfectly safe and secure, and so maintain the same for twelve months after completion, yet the Corporation recognizes that this would impose on you such immense responsibilities as the Corporation consider you could not be expected to fulfil, and could not fulfil, except at a ruinous loss. The Corporation have therefore come to the conclusion that the proper course is to release you from the obligation and determine the contract of May 12, 1903, between you and the Corporation." A plausible excuse this, for ending a contract which they had long previously determined must be got rid of. Mr. Ernest Mansergh, who succeeded his late father as Engineer, ceased to be employed by the Corporation on the reservoir scheme (though retained as Engineer of the pipe-line); and he was paid a sum of £7500. It seemed rather curious that Mr. Mansergh should get his commission on a contract which was not carried to completion; while the Contractor was not only kept out of his money for work actually done, but was called upon to repay to the Corporation moneys paid under the contract.

This concluded the first day's proceedings; and it was arranged that evidence should be called on the following morning. When, however, the hearing was resumed, it was announced that a settlement had been come to between the parties. Mr. Isaacs stated that he and Mr. W. Pickford, K.C. (who, with Mr. E. Sutton, appeared for the Corporation) had agreed that the proceedings in the action would be stayed on certain terms endorsed on their briefs, as a result of arrangements made between them; and subject to these terms, there would be a reference to the Official Referee of the whole matter.

Mr. Pickford said he did not complain in any way of his friend's opening of the case, or the manner in which he stated the facts; but he wished to say, on behalf of the Corporation, that they did not admit the facts as stated, nor the construction put on them. As the whole of the questions in the action were now to be referred to Mr. Mackenzie, the Official Referee, he had nothing more to say except that the Corporation had advice before them under which they felt that they could take no other course than the one they did. There was no intention of behaving unfairly to Mr. Kellett. If he had suffered, he could recover such compensation as was due to him.

Local Government Board Refuse a Water Loan.

A short time ago, the Maesteg Urban District Council applied for leave to borrow a further sum of about £40,000 to complete a new storage reservoir at Blaencwmceryn (having already expended nearly £30,000 on the works without having found a satisfactory foundation for the dam); but the Local Government Board have refused their sanction. This additional loan would have exceeded the borrowing powers of the Council by about £6000. Some while after the inquiry, the Local Government Board asked the Council to obtain further expert opinion as to the likelihood of a solid foundation being secured if the work at Blaencwmceryn was proceeded with. Mr. R. E. Middleton was thereupon engaged; and as his report was unfavourable to proceeding with the construction of the reservoir, the Local Government Board have advised the Council to look out for another site. The abandonment of the Blaencwmceryn scheme will mean that the £30,000 spent upon it will be a dead loss to the ratepayers. It is said to be doubtful whether a site is available in the Llynvi Valley where a reservoir would be safe from injury by the working of the seams of coal underneath, and where the springs on the gathering areas would not be liable to be tapped and drained away. The construction of another reservoir in some other part of the valley, even if it be found feasible on engineering grounds, would probably mean an outlay which would exceed the present borrowing powers of the district; but an improved water supply for Maesteg is of great importance, as for years the townspeople have suffered considerable inconvenience and risk in periods of drought.

MISCELLANEOUS NEWS.

LONDON COUNTY COUNCIL AND GAS-METER TESTING.

The Public Control Committee of the London County Council will, at to-day's meeting—when presenting the following report on the testing of gas-meters—recommend, "That the attention of the Board of Trade be called to the serious defects in the Sales of Gas Act, 1859, and that the Board be asked to introduce an amending Bill in the next session of Parliament with a view to remedying these defects and to obtaining such amendments of the existing law as the experience of the Council has shown to be desirable."

The Committee say: The Sales of Gas Act, 1859, provides for the testing of all meters used in the sale of gas, and lays down rules for such testing for the guidance of the inspectors appointed to carry out the provisions of the Act. Even before the Act came into operation, attention was called to many of its imperfections; and the Astronomer-Royal was instructed by the Treasury to report on the matter. In his report, dated Feb. 11, 1860, he commented on various faults in the Act, and stated that the omission of a test for the index was so serious as to render the Act useless.

Unsuccessful attempts have been made from time to time by the Government, by the late Metropolitan Board of Works, and on behalf of the Gas Companies and meter-makers, to obtain legislation to remedy these and other defects in the Act; and in 1868-71 the Standards Commission considered the subject and recommended the repeal of the Act of 1859, and suggested further legislation. About the same time, the Metropolitan Board of Works urged the Board of Trade to take action; and again in 1877, and from that time on to 1885, the question was the subject of correspondence between the Metropolitan Board of Works and the Board of Trade—more particularly concerning the testing of indices, on whose records large sums of money are paid. The Board of Trade promised to bring forward an amending Bill; but, as there was no prospect of getting a Bill of this nature through Parliament at the time, the matter dropped.

Hitherto the Council has made no effort to procure an amendment of the Act, but has confined itself to greatly increasing the acccommodation and facilities for carrying on the work of testing rendered necessary by the great impetus given to the meter-making industry by the introduction of the prepayment meter. Having regard, however, to the extensive use of gas for heating and power purposes, we consider the time has arrived when some further attempt should be made to remedy the present unsatisfactory state of affairs.

The principal defects of the existing Act are as follows: (i.) The Act makes it incumbent on inspectors to personally test and stamp every meter which is sent to the testing-office for the purpose. The conditions of modern gas meter testing in large towns do not enable this to be done. (ii.) The tests prescribed are inapplicable to meters above a certain size, or where meters are tested *in situ*. (iii.) One of the tests prescribed is unnecessary in the case of new meters, and greatly delays the testing operations. (iv.) Other tests, which are really necessary, and which are now carried out at the Council's offices, are not specified in the Act. (v.) No provision is made in the Act for testing the indices of meters, where the largest amount of error is likely to arise.

In addition to remedying these serious defects, new legislation should, in our opinion, also deal with other matters of lesser importance, to which our attention has been directed, viz.: (i.) The reduction of the range of error permitted in meters to 1 per cent. (ii.) The provision of an effective method of stamping meters with a view to the prevention of fraud. (iii.) The power to a consumer to have a meter tested whether it be stamped or not. (iv.) The revision of fees for testing *in situ*, and to cover the additional cost of testing the index. (v.) The simplification of the procedure in cases of appeal. (vi.) The periodical re-verification of meters.

CONTINENTAL UNION GAS COMPANY, LIMITED.

The report of the Directors which will be submitted at the meeting of the Continental Union Gas Company, Limited, next Tuesday week, and deals with the year ending June 30 last, states that at Messina and Montargis (the two stations owned by the Company) the increase in the number of consumers has been over 7 per cent., and in the quantity of gas sold 4 per cent. With respect to the large amount owing to the Company by the Messina Municipality (of which mention was made in last year's report), the Directors regret to say that the town has so far not been able to pay the instalments as they have fallen due. The Authorities, however, hope very soon to complete arrangements for raising a municipal loan, which will enable them to meet their various engagements. During the year under review, the Union des Gaz, with which the Company are closely connected, have secured the concessions for lighting the Communes of Herblay, Bezons, and Cormeilles, and have renewed the concessions of Chatou and La Celle St. Cloud. All these Communes adjoin Paris, and are supplied from the Nanterre Works. The private consumers of the Union des Gaz have increased by 16,968, making a total number of 214,448; and the public lamps have increased by 866. The total quantity of gas sold shows a most satisfactory increase of nearly 9 per cent over last year. The cost of coal was higher than in the previous year; but this was more than compensated for by the increase in the net selling price of coke. The mileage of mains has been increased by 67, making a total of 976 miles on June 30. The amount spent on capital account was £40,114, which includes the cost of the recently acquired Kehl Works, and of the land adjoining, purchased for future extensions. After providing for the further increased charge for debenture interest and debenture redemption, adding £12,000 to the sinking fund, and £40,000 to the various reserves, the Union des Gaz have been able to slightly increase their dividend, and to carry forward £10,499. The growing demand for gas in most of the towns supplied by the Company—more especially at Genoa and Milan (the two great centres of commerce in Italy), necessitates the erection of an additional works in each of these cities. To provide for this large outlay, the Directors of the Union des Gaz have resolved to increase the share capital by an issue of 20,000 new £20 shares, at a premium of £8 per share. Reverting to the Continental Union Gas Company's accounts, the outlay at Messina, after the usual amortization, stands at £85,165, and at Montargis at £20,333. The net balance of the profit and loss account available is £71,718, out of which the Directors recommend a dividend for the year of 7 per cent. on the preference stock (less income-tax), and 6½ per cent. on the ordinary stock (free of income-tax), and to carry forward £6418 to the next account. It is proposed to pay the balance dividend of 3½ per cent. on Jan. 4.

ORIENTAL GAS COMPANY, LIMITED.

The Policy of Good Reserve Funds.

The Ordinary General Meeting of the Company was held last Wednesday, at Finsbury House, Blomfield Street, E.C.—Mr. R. HESKETH JONES in the chair.

The SECRETARY (Mr. H. J. Luff) read the notice convening the meeting; and the Directors' report and the accounts for the year ending June 30, which were noticed on p. 547 last week, were taken as read.

The CHAIRMAN, in addressing the proprietors, said the report and accounts were very short, but none the less satisfactory; and they required very little explanation. The only paragraph in the report which he would allude to was the one notifying the continued increase in the revenue, which followed on a somewhat similar increase in the prior year, and which he need hardly say was most satisfactory. Turning to the accounts, it was pleasing to be able to say that the reserve and the contingency funds were both fully invested; and the proprietors would notice that the Directors had written off from the cost of these securities the sum of £643, so as to make the amount invested correspond with the total of these two funds. He might inform the proprietors that the investments represented in the balance-sheet were first-class, and negotiable; and that, although the Stock Exchange values on June 30 last were somewhat less than in 1905, the amount they had written off practically placed the investments at the present realizable prices. There was one item in the accounts upon which he thought some explanation was due. Owing to the increasing demand for gas in Calcutta, it had been found necessary not only to provide additional retorts and other accessories in the manufacturing plant, but also to increase the gasholder storage. The old holders were only equal to about 65 per cent. of the maximum daily output of gas. They had been in use for a great many years; and their efficiency could not continue for any length of time. The new holder, which would be erected by Messrs. Clayton, Son, and Co., Limited, of Leeds, would hold 1 million cubic feet of gas; and the materials for the steel tank in which it would be constructed were already in course of transit to Calcutta, where every preparation had been made to enable the Contractors to complete the work during the next few months. They had accordingly provided £5500 in the last year's accounts towards part payment of the cost of the necessary renewal and extension. It might be interesting to the proprietors to be informed that the present Engineer and Manager (Mr. James Watson) had co-operated with the Directors in their oft-repeated desire to have the ammoniacal liquor converted into sulphate of ammonia. The Company used Indian coal, which produced very weak liquor; and although the profit on the sulphate made was but small, the Directors appreciated Mr. Watson's exertions in the matter, and the running of the liquor to waste was now a thing of the past. During the past year, a crematorium had been built at the principal cemetery in Calcutta. The Company were supplying gas for the cremations—one could not say at a profit, so far; for unexpected outlay on their part had been incurred. It remained to be seen whether this mode of disposing of the remains of the dead would be adopted by the natives in preference to that now in use. Be that as it may, the Company were co-operating with the authorities; and so far they had proved that this process of disposing of the bodies of the dead could be easily and readily carried out. On the eve of their late Manager's retirement, the Company introduced the "Lucas" high-power lamp into Calcutta. Since then their present Manager had succeeded (in less than three-and-a-half years) in placing some hundreds; and the number of high-power lamps of this and various other makes now erected or on order exceeded 1000. The closing paragraph of their General Manager's annual report contained some interesting information, and he (the Chairman) would read it. Mr. Watson said: "We have had an eventful year; and Calcutta excelled itself to welcome T.R.H. the Prince and Princess of Wales. The lighting of the City is being gradually improved; and the Corporation have now determined to light one of the important avenues between North and South Calcutta with gas-lamps on both sides of the road—a principle that should years ago have been adopted for wide and important thoroughfares. We shall have orders for over 300 new lamps, some of which will be of high power for street junctions similar to those successfully in use in Harrison Road. During the year, it has been decided to maintain nearly all the Harrison Road lamps on full-time lighting, which increases the comfort and security of the inhabitants. Our position at Calcutta and Howrah is being materially improved in many respects; and the gasholder and tank to contain 1 million cubic feet of gas, for the erection of which contracts have been entered into, will be of great service. We have substituted 18-inch mains on the works for the former pipes, which were too small for our present make of gas. This work has been difficult, and has been carried out by our own staff. When we attain the position of having the mains on our works of uniform and ample size, there will be easier and more effective working. The retort-houses, coal-stores, retort-settings, purifiers, incandescent, and meter departments have all been extended during the

year; and we shall soon be in a sound position, and ready for all demands made on us. The price of rice has risen greatly; and the recent additions to the wages of the staff and workmen are accordingly appreciated. We have, I believe, a good set of workers, and loyal to the Company. I freely acknowledge the great assistance I have received from all; and it is of considerable strength to us to know that the Chairman and Directors are watching and assisting our efforts for the welfare of the Company, and that so much encouragement comes to us from the Old Country and from the London staff." He (the Chairman) might add that wages were increased somewhat after Mr. Watson was in England last year. It was quite necessary to do this; and the result had been that there had been no attempt to strike on the part of their men. He then formally moved the adoption of the report and accounts.

Mr. H. D. ELLIS seconded the motion.

Mr. E CLARKE congratulated the Directors on the accounts submitted to the proprietors. It was interesting to know they had an additional and very tangible increase on the year of more than £4000. At the last meeting, the Chairman told the proprietors that the year then under review compared very favourably with its predecessor. This being so, he, as a considerable proprietor, offered the Directors his warm thanks for the way they had conducted the affairs of the Company. There was only one thing he would say, somewhat in the minor key. It was that, notwithstanding their increased revenue, the Directors had thought proper to write off from one year's profits a large sum in connection with what was being spent on the new gasholder, and were administering the Company's affairs in a very conservative way. Had not the time arrived when the proprietors might participate a little in the increased prosperity? Some years ago they regularly had 9 or 10 per cent.; and it would be a good thing if the proprietors could now have an increase upon the 8 per cent. at present paid to them as dividend.

Mr. J. H. MACKAY said it was satisfactory to all the proprietors to know that the stream of prosperity of the Company had flowed so long. He agreed that the Board were now a little too conservative, and that the proprietors might participate to an extent in the portion of the earnings that was now put aside for the benefit of future generations of shareholders.

The CHAIRMAN, in reply, said the Directors prided themselves on being called conservative. The proprietors were not, of course, aware of all the circumstances connected with the management of a Company some 6000 miles away from London, and a Company which depended very largely upon the supply of gas for public lighting. They were not like an English Company where the public lighting was really of little or no consequence; to their Company it was of the greatest importance. It had been the object of the members of the present Board to improve the property, and to place the Company in a strong position to fight the electric light. Electricity was a very great competitor for them; and their contracts for public lighting were only for a limited period. Therefore it was highly desirable they should fortify themselves against any contingency. In paying a dividend of 8 per cent. (instead of 9 or 10 per cent., which ought never to have been paid), the Directors were conserving the interests of the Company, and consequently of the proprietors. The object of the Board was to secure a permanent dividend of 8 per cent. for the proprietors; but if at any time they—the Directors, it should be remembered, were considerable proprietors—saw their way clear to pay a higher dividend, and it was desirable, they would give the matter their best attention. He could not, however, hold out any hopes of an immediate increase. The new gasholder must be paid for out of the next three or four years' revenue. In his opinion, it was a very satisfactory position to be in, to have paid off the debentures, and to have funds in hand. It was, above all things, highly desirable that they should maintain the present position.

The motion was unanimously carried.

On the proposition of Mr. ROBERT MILLER, seconded by Mr. A. T. EASTMAN, a dividend of 8 per cent., free of income-tax, for the twelve months ending June 30 was declared, less the 3½ per cent. paid in June last.

Moved by Mr. W. WILLIAMS, and seconded by Mr. G. F. THOMPSON, Mr. Eastman was re-elected a member of the Board; and proposed by Mr. E. F. WHITE, and seconded by Mr. W. C. ELLISON, the Auditors (Messrs. S. W. Savage and F. Seel) were reappointed.

Mr. EASTMAN thanked the proprietors for his re-election; and Mr. SEEL did the same on behalf of himself and his colleague. The latter gentleman also remarked, regarding the question of the increased dividend, that the Directors held in hand the accumulated funds to meet any eventuality or necessity. They were only saving up the money for the proprietors; and he maintained if any proprietor wished to realize his holding that he would get all the benefit of these savings in the price he would obtain.

Mr. T. W. FORMAN moved a vote of thanks to the Chairman and Directors, and, in doing so, endorsed the policy of the Directors. He did not think they could do too much in the way of building up good reserves. He totally disagreed with one of the previous speakers on this point. As a considerable proprietor, he thought it was their duty to posterity to strengthen by all reasonable means the position of the Company.

Mr. JOHN COPPEN seconded the motion, which was unanimously agreed to.

The CHAIRMAN, in responding, thanked the proprietors for this recognition of their services, and for the kind criticism and support that had been passed upon, and given to, the policy of the Board. Before concluding, he moved a vote of thanks to the Manager, Assistant-Manager, the Secretary, and their respective staffs, as well as the employees. With the management of Mr. Watson, he was highly pleased. He represented the Company satisfactorily in Calcutta, and his correspondence was most helpful to the Board. Whatever the Board suggested, he took up with spirit, in order to assist to the advantage of the Company. As to the Secretary, he was, as they all knew, most zealous in the interests of the Company.

Mr. LUFF acknowledged the vote, on behalf of all included in it; and the proceedings then terminated.

NOTTINGHAM GAS CONTROVERSY.

It is an easy matter at all times to attach undue significance to the result of bye-elections; and the temptation is as strong in relation to municipal as to parliamentary contests. But it would be difficult to exaggerate the meaning to be attached to the outcome of a struggle which culminated at Nottingham on Friday, when issues which bore mainly upon the gas controversy were decided. In Robin Hood Ward, which covers an extensive area of residential property, and includes also not a few of the largest manufactories in the town, a casual vacancy had arisen by reason of the elevation to the aldermanic bench of Mr. J. A. H. Green, the present Mayor, who had for many years been one of the representatives of the district in the Liberal interest. The rival candidates were Mr. H. Gover Ford, a solicitor, who came forward at the invitation of the Conservative party, and Mr. Alfred Richards, a lace manufacturer, who is held in high esteem in commercial circles, and was supported by the complete forces of the Liberal organization. It was thus a fight on strict Party lines; but, above all, the predominant question raised at the election had relation to the management of the gas undertaking, and necessarily, as incidental thereto, the proposed exercise of the powers of the majority in regard to the *personnel* of the new Committee. The process by which it is proposed to remove from the Committee two of the former Conservative members—Dr. Milner and Mr. Albert Ball—thus abrogating the principle under which selection in a given ratio of numbers has been hitherto allowed to the respective sides, has come in for unsparing condemnation. And the criticism has been accentuated by the circumstance that, while the ostensible reason for removing Dr. Milner and Mr. Ball from the list is that they have been too active in the public discussion, to the possible injury of the largest trading concern in the hands of the Corporation, Alderman J. Jelley has been again nominated to occupy a place on the Committee. The Alderman was associated with Mr. E. Harlow (the late Chairman) and Mr. R. Sands in the attitude they took up towards the Engineer; and he was also one of the witnesses who gave evidence before the Special Committee of Investigation. This attitude was not, to say the least of it, of an amicable character in regard to Mr. Brown. The Robin Hood Ward electors, however, have indicated in unmistakable terms what they think of the whole business. Mr. Ford, who has expressed himself as favourable to the fullest inquiry in relation to the gas undertaking, has been returned by a majority of 178 votes; thus securing an addition to the Conservative ranks in the Council, and incidentally of those who desire that there shall be no injustice done in a matter vitally affecting the integrity of municipal administration.

In whatever way it is looked at, the bye-election under notice reveals a complete condemnation of "caucus" methods, which in the attempt to save political friends would pay little regard to the professional standing of a skilled man. The heavy artillery of the partisan forces was brought to bear upon the attack. Mr. A. W. Black, M.P., one of the Liberal representatives of the ward, found it desirable to leave his work at Westminster for some time in order that he might come to the help of Mr. Richards. But it was all to no purpose. The elections here, as in two other notable instances at the more general appeal on the 1st of the month, have shown that they are averse to allowing the "confidential tribunal" idea to have further sway. Mr. Burns's reply to the request for a Government inquiry had not, up to the time of writing, been forthcoming. If, as is probable, he finds it impossible to go back upon his former answer as to the impracticability of official intervention, the demand is certain to grow that some other means should be found of bringing the whole matter into the light of day. Upon this point Sir J. T. M'Craith has made a suggestion which, if accepted, might cut the Gordian knot of the whole difficulty. He has pertinently asked why the Council should go to the trouble of inviting the President of the Local Government Board to decide whether it is necessary that the suggested public inquiry should take place. All that is requisite, Sir John points out, is that three gentlemen who act under the leadership of Dr. Fraser, as head of the Liberal party in the Council, should say they are willing that the statements they were responsible for at the sittings of the Committee should be made public, and then copies of the whole of the evidence might be circulated among the councillors. But while the consent was forthcoming as to forwarding the statements to the President of the Local Government Board, it is extremely problematical whether the course suggested by Sir J. T. M'Craith will be acquiesced in. The supply of the information to Mr. Burns is under the same strict arrangement as to privilege as that which obtained in regard to the conditions under which the testimony was originally tendered.

If a reasonable spirit, apart from political animosities, can be imparted into the consideration of the case, there is yet reason to hope that a settlement of difficulties may be effected to the advantage of the ratepayers, who desire that out of chaos order may be evolved. But the Special Committee's recommendation as to a division of responsibility is apparently the rock upon which a well-intended scheme is likely to split. Unprejudiced business men locally, favour the idea that the main matter of the report in this essential should be submitted to expert judgment, for thereby alone is a permanent solution likely to be reached. Obviously, the proposed re-arrangement and division of responsibility is not above criticism; and, in the almost inextricable mass of detail involved, is it reasonable to expect that those who have been engaged for the greater part of their lives in matters which have not the remotest association with the manufacture or distribution of gas can be the best judges? If rumour should be justified as to the name of the possible future Chairman of the Gas Committee, the situation is likely to become Gilbertian in its character. The next meeting of the Council will reveal some further movements of interest in a party manœuvre in which for the moment the majority in the Council have received a shock by reason of the result in the Robin Hood Ward.

Some fear was felt for the safety of the Barrow Gas-Works last Wednesday night, when a disastrous fire broke out at the adjoining engineering works of Messrs. Waddington and Son. Fortunately, however, the brigade were successful in preventing this.

GAS-MAINS UNDER TRAMWAYS.

Conclusion of the Hastings Arbitration Proceedings.

At the Westminster Palace Hotel last Friday, the arbitration proceedings between the Hastings and St. Leonards Gas Company and the Hastings Tramways Company, in respect of a notice given by the former, under section 30 of the Tramways Act, 1870, requiring the Tramways Company to remove certain mains and pipes from under the tramways which are in course of construction from the Bo-Peep Hotel, St. Leonards, to Queen's Road, Hastings, were resumed before Mr. H. GRAHAM HARRIS, M.Inst.C.E.

Mr. G. WOOD HILL and Mr. E. HUMPHREYS represented the Gas Company; Mr. C. C. HUTCHINSON and Mr. W. FLETCHER MOULTON appeared on behalf of the Tramways Company.

Mr. *P. H. Palmer*, the Borough Surveyor of Hastings, who had been subpœnaed, was called with reference to correspondence which passed between himself and Mr. Charles E. Botley, the Gas Company's Engineer and Manager. In one of these letters, witness agreed that he had said that the concrete had fallen, and that mud was working up on to the road; and Mr. Botley said that all his Company desired was protection against leakage of gas owing to the uncertain nature of the ground, of which they had had experience.

The ARBITRATOR announced that he and the parties concerned would view the tramway track, through which holes would be made.

Mr. HUTCHINSON, in addressing the Arbitrator on behalf of the Tramways Company, remarked that the correspondence which had taken place showed that the complaint of the Gas Company was one which was not based upon anything involved in the construction of the tramway. Their contention was that the Tramways Company would endanger the mains beneath the lines in the working of the tramway, and not by its construction. Nobody had said how much of the main was to be removed; and this was one of the difficulties with which the Arbitrator had to deal. But if the mile-and-a-half of pipes had to be interfered with, a cost of many thousands of pounds would be involved. If the Tramways Company were to damage the pipes by the alleged vibration, they would be held responsible, because the Gas Company could show that, by reason of the nature of the subsoil along the road, the tramway had been constructed in such a manner as not to have taken this into account, and thereby damage had been caused to the Gas Company and other persons, which constituted negligence. The point was that, without having the pipes removed, and without any order from the Arbitrator, the Gas Company could get full redress. The Tramways Act contained an enabling section, whereby the Tramways Company could, if necessary, remove any mains or pipes. The only argument put forward by the Gas Company was the effect of vibration on the mains underneath the tram lines. That which the Company had endeavoured to show in the present case was that the construction of the tramway was endangering their mains, so far as the supply of gas was concerned. But their case had entirely broken down. The Tramways Company had given more than was asked of them, and the Gas Company had entirely failed to show that any vibration was likely to cause injury, or would be transmitted to the mains. He could not believe that a little harmless tramcar would imperil the safety of a well-laid main which had withstood the enormously greater effect of a road-roller.

Mr. WOOD HILL, in reply, said the question was as to the propriety of constructing a tramway such as the one at Hastings over gas-pipes laid in such subsoil as that which existed there. Nor must the question of the use to which the tramway would be put be excluded. The Arbitrator would have to consider the state of the road and the position of the pipes and the tram lines; and he would also have to consider whether the road was or was not reasonably safe. There was also the point that, in case any accident should occur with the tramway, there would be a difficulty in getting at the pipes. As a matter of law, if the gas escaped into a house and caused a nuisance, the Gas Company would be liable; but if the escape was caused by the working of the tramway, the Gas Company would be entitled to recover from the Tramways Company if they could prove that the escape was caused by their negligence. So that the position of things in this respect, as between the public and the gas companies, was nuisance; and as between these companies and tramway companies, negligence. As a matter of business, the position here was this: What chance would the Gas Company have of claiming against the Tramways Company if the latter brought forward the fact that the Gas Company had complained of the construction, and one of the most skilled engineers had decided that there was nothing in the complaint? The danger was that the continual working of the tramway would shake the earth and imperil the safety of the gas-pipes.

The hearing then concluded.

Fire at the Barking Gas-Works.

Damage which is estimated at about £500 was caused by a fire which broke out in the governor-house at the Barking Gas-Works last Wednesday afternoon. At about half-past three, a slight explosion was heard in the governor-house, which adjoins the carburetting house, and immediately afterwards the place burst into flames. Mr. W. B. Reidie, the Manager, upon hearing the explosion, ran across the yard and found the building burning fiercely from top to bottom. At this moment a youth named George Taylor, a pupil of the Gas Company, whose duty it was to start the carburettor, was seen to rush from the governor-house, enveloped in flames, which, after some difficulty, were extinguished by Mr. Reidie, whose fingers were severely burned. The fire made rapid progress, but fortunately Mr. Reidie was able to enter the burning building and cut off the supply of gas; and he also prevented a further quantity of inflammable liquid from reaching the flames. The origin of the fire is unknown; but it is supposed that the explosion was caused by an escape of benzol vapour coming in contact with an open flame. The loss is covered by insurance.

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THE SMOKE PROBLEM AT MANCHESTER.

A leading article in the "Manchester Guardian" on the report of the Smoke Abatement Society which was noticed in last week's "JOURNAL" (p. 539) has led to some interesting correspondence with regard to the advantages of gas-fires as a remedy for a smoky atmosphere. More than one writer challenges a statement contained in the article to the effect that "it is the smoke from the thousands of dwelling-house chimneys, far more than from the hundreds of factory chimneys, that makes the air of Manchester grimy and corrosive," and asserts that the mill chimneys are the chief culprits. In a long letter, Mr. John W. Graham draws attention to the need for low-priced gas to encourage its more general use. He says:—

The practice of paying over a profit of £60,000, or 3d. per 1000 cubic feet (last year's figures), in relief of rates, has nothing in its favour financially. We pay through our gas bills what we save on our rates. If everybody consumed gas in proportion to his rate assessment, it would be merely a valueless form of deception practised by the public on itself, by choosing to pay its rates in a less conspicuous way, and so pretending that it escapes them. But, of course, there is no such fairness as that about it. The gas we consume depends upon our business, not upon our assessment. The great social importance of the matter arises from the fact that, in order to clean our atmosphere of smoke, keep its corrosive grime from our clothes and buildings, the fog from our eyes and throats, and the dirt from our skins and our lungs, there is no better way than to burn gas instead of coal. Every citizen who uses a gas-fire or a gas-cooker is making less dirt than his neighbours, and costing the city and his neighbours individually less. There is reason to believe that, when everything has been counted in, fog and dirt, darkness and destruction, disease and death, due to smoke, cost Manchester about a million pounds a year. Spend gas profits in public improvements indeed! They are money indirectly earned by destroying every clean thing. A man who avoids making his share of public dirt should be rewarded, instead of paying an extra rate bid in his gas bill. To sell gas slightly under cost would be well worth the while of any city, and entirely just.

But we in Manchester charge the gas account also with an amount for city rates which added 2½d. per 1000 feet to the price during 1905—a payment back and forward which has only the effect of still further hampering the Gas Department to pay the other city expenses. If we add this 2½d. to the previous 3d. of artificial profit and a small surplus, we obtain close upon 6d. per 1000 feet added to the cost of gas, through, one might suppose, a love of dirt and fog. One penny has been taken off this year; and there remains the fact that we could at once reduce the price of our gas by 5d. more, and sell it without loss at 1s. 10d. per 1000 feet for household uses. This difference, at just this point, is of crucial importance, for gas at 2s. 3d. is a little dearer than coal in any gas-fire which is being used all day or for most of the day; and gas at 1s. 10d. is as cheap as, or cheaper than, coal, besides being clean, convenient, and smokeless. The margin between 22d. and 27d. is great enough to mean the gain or loss of trade in most businesses.

Every drop in price hitherto has, as was to be expected, increased the consumption of gas. The probability is that this reduction of 5d. per 1000 feet would have an incalculable effect in stimulating the use of gas fires and cookers. The latter are wisely lent gratis by the Gas Committee to the number of 30,000. Even as it is, 6000 stoves are lent every year. Moreover, this extra demand on the gas-works would be both a daylight demand and an all-the-year-round demand so far as cookers are concerned. That is, it uses the plant at its slack time, in itself a secret of profit; and it would certainly open the way to a greater fall in price. Indeed, we might safely begin at 1s. 9d., and expect further reductions.

One charming little peculiarity of our present system of keeping accounts is that we make the income-tax a present of £3000 a year, being the tax on the gas "profits"—profits which go at once to pay other Corporation expenses. Would any private concern throw away this sum, merely to maintain a vicious system of indirect rate-collecting—a system which happens also to be fatal to our best hope of breathing clean air and seeing the sun shine? In October, we had less than two hours a day sunshine, whereas even London had over three.

INCANDESCENT GAS LIGHTING FOR CHURCHES.

Inverted v. Upright Burners.

Our readers may remember that some remarks on the above subject have been made in recent issues of the "Ironmonger." With reference to the letter from a correspondent which we reproduced last week (p. 547), Mr. L'ce Fletcher, the Managing-Director of the Welsbach Incandescent Gas-Light Company, Limited, sent the following letter to our contemporary.

Within the last two years I have come across, I suppose, eight or ten installations of inverted burners in places of worship, and I have not seen a single one which has proved satisfactory or successful, in the sense that sooner or later there is trouble with breakage of globes, especially through the church authorities following their usual custom of attempting to lower the lights during the sermon.

With regard to the breakage of glass, I hold that no inverted burners should be fitted in places of worship unless the globes have first been wired. Otherwise, should the glass break it falls red hot sheer upon anyone sitting below; and apart from the question of fire, which is a possibility, there is the probability of panic. The most important point of all, however, is that nine church-lighting authorities out of ten insist upon turning their lights down during the sermon; and I need hardly say that there is no inverted burner on the market which will admit of being turned down. It must be used full on or it

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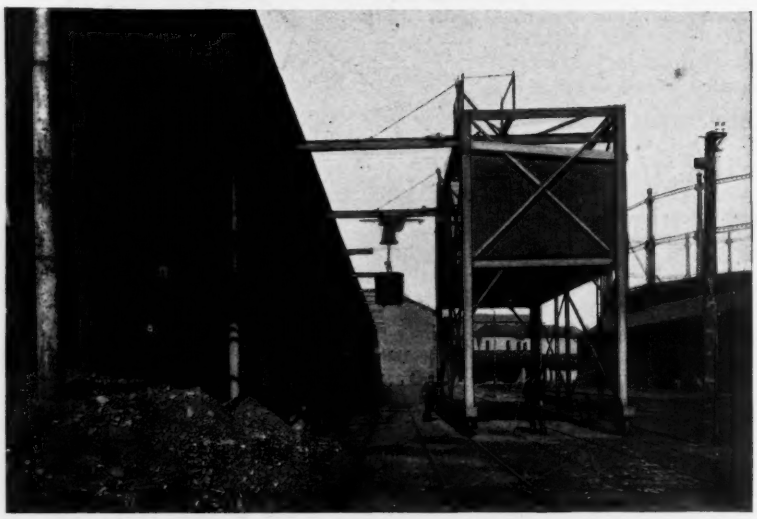

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must be turned right off; otherwise carbonizing of the mantle results, with its attendant annoyances.

The other point I wish to take up strongly is the statement made in the letter that the inverted burner represents a great economy in gas consumption over the vertical burner. It does nothing of the kind. The No. 3 Welsbach Kern upright burner and mantle is used in hundreds of churches throughout the kingdom, and is everywhere giving the greatest satisfaction; and in scores of instances I am in a position to prove not only enormous reductions in the gas bills, but the fact that these burners have, in accordance with our guarantee, been consuming less than 3 cubic feet of gas per hour at normal pressures, giving, in spite of that small consumption, their stated illuminating power of 75 candles or thereabouts.

Moreover, as is also the case with flat-flame burners, they can be turned down from a distance to any point desired; and after the service is over they can, by bye-passing the meter, be turned down so as barely to leave the burners alight, with or without a pilot-light, and with perfect safety. This is something that cannot be satisfactorily done with any other incandescent burner on the market.

Further, I have not yet seen (with the exception of the Welsbach Kern inverted burner) a burner of the inverted type consuming less than 3 cubic feet of gas per hour, under ordinary circumstances at normal pressures, and giving a result equal to that achieved by the No. 2 Kern burner, which consumes only 2¼ cubic feet of gas per hour, and gives a light of over 50-candle power.

I hope your readers will not infer that I am condemning the inverted system, far from it; I consider there is a future for it. But many dealers are unfortunately selling inverted burners which are absolutely unfit for use, and, in my judgment, constitute a danger to human life.

BLYTH GAS COMPANY AND BEDLINGTON GAS-WORKS.

The Proposed Purchase Rejected.

We understand from the "Blyth News" that, at an extraordinary general meeting of the shareholders of the Blyth and Cowpen Gas Company last Tuesday, the proposal to purchase the Bedlington Gas-Works was rejected. Considerable interest had been provoked by the suggested transfer. As numbers went, it was a record meeting; the Company's office being tightly packed. But the voting was largely by proxy. The veteran Chairman threw his weight against the scheme; and the result was the no purchase vote was endorsed by a majority of 27—the figures being 322 and 295. This is the scheme that was referred to in the article in the "JOURNAL" for Oct. 16, headed "A Strange Case of the Sale, Purchase, and Re-Sale of a Gas-Works." At this special meeting, neither the Directors nor the Solicitor of the Blyth Company (who formed the Syndicate) voted, but very properly left the matter entirely in the hands of the shareholders. The position had undergone some modification since the matter was last alluded to. It will be remembered that the price paid by the "Syndicate" for the Bedlington concern was £2750; and at the time of the article in question, the Directors had been authorized to enter into negotiations for the purchase of the property. The Syndicate, it will also be remembered, was composed of four of the Directors of the Blyth Company, the Solicitor, and the Secretary; so that, to all intents and purposes, the Directors had been authorized to negotiate with themselves. A price of £4000 was rumoured as being somewhere about the views of the "Syndicate;" but, before the extraordinary meeting, the Directors gave an assurance that they would not accept any profit on the transaction, and that the transfer could take place at the £2750, *plus*, we suppose, the transfer costs and interest. This, of course, considerably altered the position; but nevertheless the shareholders would not have the undertaking. The Syndicate will now be able, if they do not otherwise dispose of the concern, to set themselves to establishing on their own account the gas supply of Bedlington on a thoroughly satisfactory basis. Notwithstanding our former criticism, we hope that they will succeed; for we have no desire that Bedlington should be denied cheap gas, so long as it is not, as it originally appeared would be the case, obtained at other people's expense.

METROPOLITAN WATER BOARD.

At the Meeting of the Board on Friday last, the Finance Committee presented a report by the Comptroller on the present position of the capital accounts. It showed that the total expenditure from the appointed days to Sept. 30, 1906, amounted to £2,462,507, a great part of which was in respect of works in course of construction at the date of the transfer of the undertakings. Of this sum, £2,141,824 had been raised; leaving a deficiency of £320,683 on the aggregate account. This deficiency was made up of overdrawn accounts £476,137, and capital accounts showing a balance in hand of £155,454. Of the expenditure of £476,137, the sum of £37,724 comprised the actual cost of completed works and the amount expended to date in respect of works in course of construction; and it would be an advantage, the Committee said, if application were made to the Local Government Board for their sanction to loans representing the estimated cost of completing the works in addition to the amount already expended. The Committee recommended that application should be made to the Board for sanction to the raising of loans to a total of £96,482; and this was agreed to.

The Works and Stores Committee presented a report which contained particulars, in the usual tabular form, in regard to the supply of water to the Metropolis in the month of October. We take from them the following figures: The average daily supply was 223,042,000 gallons; number of houses supplied, 1,055,803; estimated population, 6,860,315; mean supply per head per day, 32·5 gallons (corresponding month last year, 31·5 gallons); water in store, 5,411,000,000 gallons (corresponding month last year, 5,103,000,000 gallons).

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From Our Own Correspondent.

Saturday.

A week ago an untoward event disturbed the even tenor of proceedings in the Perth Corporation Gas-Works. I take the following account of it from the "Perthshire Advertiser" of Wednesday, which is the most moderate description I have seen of the occurrence: "Since Saturday, the gas consumers in the city have been suffering more or less from obnoxious sulphurous fumes which have permeated their dwellings, and filled lungs, throat, and nose. . . . The official explanation is that an unfortunate breakdown occurred at the gas-works on the evening of the day mentioned; that spontaneous combustion occurred in the purifying material; and the sulphur previously absorbed was displaced and driven forward into the pipes. It is further stated that more purifying vessels are required, which could be brought into action in such an emergency, in view of the largely increased consumption of gas. An impurity, technically known as sulphur dioxide, was the cause of the whole unpleasantness; but it is satisfactory to learn, on the authority of the Gas Manager, that the defect has been remedied, and that the plant has now been restored to its normal condition. The dregs of the unpurified material remain so far in the pipes; but this will gradually disappear as the gas is used. An idea of the great increase in the manufacture of gas in Perth will be learned from the fact that at the old works the output was 148 million cubic feet; while it has risen to 203 million cubic feet last year at the new works. When the new gas-works were planned, it was intended that eight purifiers should be built; but only half of this number have as yet been supplied. In order that steps may be taken to avoid a recurrence of such an unfortunate accident, it is more than probable that the Convener will bring the whole matter under the notice of his Committee. It should also be noted that in the old gas-works there were six purifiers, and that at the present time the new works are simply doing the enormous output with half the number that was originally contemplated. The sulphurous fumes from the unrefined gas were felt almost everywhere. . . . It is satisfactory to learn that the defect has now been remedied, and that the future occurrence of such an unfortunate mishap will be obviated by the Gas Manager and Convener being empowered to procure the additional plant that is necessary to overtake the proper purification of gas at the new works." It will be observed that this account takes no note of the nature of the mishap which occurred at the works. From another source I learn that, in the course of Saturday evening, a sudden rise in the temperature of one of the purifier-boxes was observed. The box was cut off, and thereafter its contents became red hot, in consequence of which it could not be emptied for some time. Jets of steam were kept playing upon it, and about two o'clock on Sunday morning it was considered to be safe to open the box and empty it. It is added that early on Monday morning there was a recurrence of the accident in another of the boxes. What led to the sudden rise in the temperature is not explained, and we can only surmise. Surmises are useless; but as every scrap of information upon such a matter is valuable, it may be interesting to refer to what Mr. W. B. M'Lusky, the Engineer, said upon the subject of purification at the Informal Meeting of Gas Managers in Glasgow last April, which will be found in the "JOURNAL" for April 10 (p. 108). Some enlightenment may be got from a perusal of Mr. M'Lusky's remarks on that occasion.

The subject of the quality of gas in Dundee was before the Gas Committee of the Corporation on Tuesday. Mr. J. M. Soutar, who raised the subject, put a series of questions to Mr. A. Yuill, the Engineer and Manager. Mr. Yuill, anticipating something of the kind, had prepared a draft report, which he read to the Committee. In it he stated that he presumed that most of the complaints had special reference to the want of pressure, which was often confounded with quality. As was well known in the gas profession, most towns suffered more or less during late autumn from the precipitation of naphthalene. It had been stated by some that the presence of naphthalene was aggravated by the enriching processes in use—by carburetted water gas or benzol. It was well known that both of these in the gaseous state tended to raise the vapour tension of the gas; thereby preventing, to a large extent, the precipitation of naphthalene at ordinary temperature. He might mention that the first day he entered the Dundee Gas-Works he found one of the large tower scrubbers out of use, owing to its being blocked up with naphthalene. When this scrubber was removed, the 14-inch pipe connecting it was found half filled with crude naphthalene. He was making experiments at the present time as to the best way of absorbing the naphthalene during the process of manufacture, and would report the result of his investigations in the near future. It was recognized—and he had found it from his own experience—that the public lamps, from their exposed position, were the first to suffer from the high percentage of naphthalene. The Superintendent of Lighting informed him that every lamp was free at the present time. Of the complaints received on 9th inst., 13 were due to services choked; 8 to stove-fittings choked; 3 to water in fittings; 3 to water in services; 5 to meters requiring water; 6 to meters being faulty; 5 to water in the waste-box; and 2 in which nothing was found wrong—making a total of 34; while there were 14 complaints due to escapes. Taking the complaints received on the 19th inst., he found that 71 per cent. were due to defective fittings; 33 per cent. were fitted with ½-inch inlet and outlet at the meter; and 12 per cent. had ⅜-inch inlet and ¼-inch outlet. A very flagrant case presented itself in one of the public schools, where it was found that a 2-inch inlet-pipe to the meter was reduced to a ¾-inch pipe at the outlet, to supply gas to 82 jets. In another case a ½-inch pipe supplied a house on the street flat, and three houses above; 18 inches from the meter the pipe was reduced to ⅜-inch, to supply five jets, two gas-fires, and one ring. In June, 1904, regulations were adopted and issued to architects, builders, and gas-fitters for the regulation of the size of pipes and fittings; but the difficulty was not so much with new as with old buildings and pipes, which were often quite inadequate to

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	Winnipeg, Man.	500,000	Malton	150,000
Windsor St. Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Smethwick	500,000
Saltley Works, Birmingham	2,000,000	York	750,000	Gravesend	300,000
Colchester	300,000	Rochester	500,000	Pernambuco, Brazil	125,000
Birkenhead	2,250,000	Kingston, Ont.	300,000	Duluth, (Second Contract)	300,000
Devizes	120,000	Crystal Palace District	2,000,000	Leicester (Second Contract)	1,000,000
Saltley, Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Newport (Second Contract)	250,000
Windsor St., Birmingham (Second Contract)	2,000,000	Caterham	150,000	Brockville	250,000
Halifax	1,000,000	Leicester	2,000,000	Toronto (Third Contract)	750,000
Toronto	250,000	Enschede, Holland	150,000	Montreal, Ont. (Second Con.)	1,800,000
Ottawa	250,000	Buenos Ayres (River Plate Co.)	700,000	Toronto (Fourth Contract)	1,000,000
Lindsay (Remodelled)	125,000	Burnley	1,500,000	Hamilton, Ont.	400,000
Montreal	500,000	Kingston-on-Thames	1,750,000	Rochester (Third Contract)	1,600,000
Toronto (2nd Cont., Remodelled)	2,000,000	Accrington	500,000	Leeds (Second Contract)	900,000
Belleville	250,000	Tonbridge	300,000	Buenos Ayres (Primitiva Co.)	1,200,000
Ottawa (Second Contract)	250,000	Stretford	500,000	Buenos Ayres (New Co.)	1,200,000
Brantford (Remodelled)	200,000	Oldbury	300,000	Christchurch, N.Z.	300,000
St. Catherines (Remodelled)	250,000	Todmorden	500,000	Rochdale	1,600,000
Kingston, Pa.	125,000	Saltley, Birmingham (Third Contract)	2,000,000	St. John's, Newfoundland	250,000
Peterborough, Ont.	250,000	York (Second Contract)	750,000	Brantford (Second Contract)	400,000
Wilkesbarre, Pa.	750,000	Rochester (Second Contract)	500,000	Smethwick (Second Contract)	500,000
St. Catherines (Second Cont.)	250,000	Newport (Mon.)	250,000	Pontypridd	250,000
Buffalo, N.Y.	2,000,000	Tokio, Japan	1,000,000	Montreal (Third Contract)	1,800,000
		Newcastle-on-Tyne	1,800,000	Guelph, Ont.	350,000
		Leeds	1,800,000	Buenos Ayres (River Plate Co.) Second Contract	750,000
				Belgrano (River Plate Co.)	500,000
				Quebec	250,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

give a supply of gas at ordinary pressure. Conditions have entirely changed within recent years, through the introduction of incandescent burners. With an ordinary burner it was volume that was required; but with the incandescent burner, it was not so much volume as pressure. The report was received by the Committee, and Mr. Yuill was instructed to have it prepared in permanent form, to be put upon the minutes; and consideration of it was deferred.

On the evening of Sunday last, a series of violent explosions occurred in street manholes connected with the electrical undertaking belonging to the Corporation of Dundee. There were twelve loud detonations, following each other at intervals of about 15 seconds. Manhole covers, followed by stones and broken concrete, were hurled into the air with great force. Great alarm was created; but there was no loss of life, and only one or two persons were injured. One or two shop-fronts were, however, damaged by flying debris. It appears that the wires for carrying electric current were originally laid in cast-iron pipes. This system has been superseded; the conduits being now formed of porcelain and bitumen. The explosions are attributed to the presence of some description of gas in those disused pipes and manholes; and the Gas Committee have resolved to recommend that all these obsolete arrangements—about 7500 yards in extent—should be removed, at a cost of about £500. The Town Council on Wednesday considered this recommendation, but did not adopt it. What they resolved to do was to order that the manholes be filled up, and the pipes left in the ground till the officials report upon the matter of the explosions.

On the same day, the Town Council of Dundee considered in detail the Provisional Order which they are promoting; and, by a majority of 19 to 5, they struck out the clause in which it was proposed to place the cost of lighting common stairs upon the rates. In the discussion, the arguments were used that the proposal would be a relieving of owners of slum properties of burdens which they ought to bear; and that Glasgow has twice refused to adopt the policy.

The Lanark Town Council on Monday held a special meeting to consider as to the confirmation of the resolution, adopted on July 9, in favour of adopting the Burghs Gas Supply Acts. The Town Clerk, in reply to a question, said his opinion was that confirmation of the resolution did not commit the Council to anything. His reason for saying so was that, before there could be any arrangement between the Corporation and the Gas Company, there must be notice to treat given. This had not yet been done. The resolution was confirmed.

The first ordinary general meeting of the Turriff Gaslight Company, Limited, was held on Monday. Provost Hutcheon was re-appointed Chairman. A dividend at the rate of 5 per cent. was declared.

The Dumfries Town Council have re-appointed Provost Glover Convener of the Gas Committee, with Bailie Thomson as Sub-Convener. The Peebles Town Council have appointed Provost Sir Henry Ballantyne Convener of the Gas Committee. Mr. G. Kemp has been re-appointed Convener of the Gas Committee of the Aberdeen Town Council, a position he has held for several years. The Hamilton Town Council have re-elected Bailie Hamilton Convener.

CURRENT SALES OF GAS PRODUCTS.

Week ending Nov. 24.

On the London market, the large inquiries for pitch have steadied the value of that article, and the opinion prevails that the fall in price has ceased. The shipments for December are expected to be unusually large. All other tar products are strong; the approximate net quotations being: Creosote oil 2⅜d., anthracene oil 3d., 90 per cent. benzol 1s. 1d., 95 per cent. solvent naphtha 1s. 5d., 60's crude carbolic acid 1s. 9d. to 1s. 9½d., and pitch 29s. Sulphate of ammonia is quiet, and remains unchanged.

Sulphate of Ammonia. LIVERPOOL, *Nov.* 24.

All through the week the market has been extremely quiet; and it has been difficult to find buyers at any point except Leith, where rather large shipments have cleared available supplies. At other ports, November contracts being covered substantially, sales have only been possible at declining prices; and at the close supplies rather exceed demand. Consequently, quotations are down to £12 1s. 3d. per ton f.o.b. Hull, £12 3s. 9d. f.o.b. Liverpool, and £12 7s. 6d. per ton f.o.b. Leith. Buyers have withdrawn from the forward position, unless at prices but little above spot values, which makers altogether decline to accept. There has been a certain amount of speculative selling, but exact prices have not so far transpired.

Nitrate of Soda.

This article has also been quiet, in all positions, and closing spot prices are 11s. 6d. and 12s. per cwt. for 95 per cent. and refined qualities respectively.

Tar Products. LONDON, *Nov.* 24.

Markets have been steady during the past week, with prices, on the whole, well maintained. Pitch is quiet, and low prices have been accepted for prompt delivery. In London, business could be done at 28s. for prompt; while a firm offer at a little under this might result in business. On the east coast, sales have been made at 26s. 6d. and 27s. for prompt; while for forward, business has been done at 27s. to 27s. 6d. On the west coast, 26s. has been booked at Manchester, and 27s. Liverpool, for prompt; but for forward delivery, the market is rather firmer than this. Creosote is still very firm. Some quantity of second-hand London oil could be purchased at 2⅛d., and even a little under; but for forward delivery, makers are very firm in their ideas, and, as they are well sold, do not care to make offers. In the Midlands, prices are good, and makers are not inclined for further business at present. The same remark also applies to the North, where manufacturers are fairly well sold. In carbolic acid, consumers are still willing to pay 1s. 9d. for prompt on the Continent, and have secured some quantity at this

GAS STOVES! GAS STOVES!! GAS STOVES!!!

All Gas Engineers and Officials should

See the "LANCET" of 17th November, 1906,

for

Report of the Smoke Abatement Society on the Tests of Gas Fires.

OBSERVE

THE "CANNON'S" GREAT SUCCESS.

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NOTE OUR ADDRESS—

CANNON IRON FOUNDRIES, Limited,

DEEPFIELDS, STAFFS., and 58, HOLBORN VIADUCT, LONDON, E.C.

figure; but for forward delivery, they report having refused offers at 1s. 8½d. all over next year. There is no alteration in crystals. Benzol, 90 per cent., is very firm. In the North, makers are asking 11¾d. to 1s. for January-June; but 1s. has been paid for prompt delivery in London, and even higher prices are talked of. In 50-90 per cent., a small quantity was reported to have been sold at a reasonable price in London for prompt delivery; but, generally, the market is firm, and prices are well maintained. Regarding solvent naphtha, actual London qualities are still fetching high figures for prompt delivery, owing to makers being so well sold that they have little to spare; while for next year 1s. 3d. is reported to have been paid on the east coast, and even more than this in London. Toluol is unchanged. Business is reported to have been done in the country at 1s. 1½d.; but a small quantity was sold in London at over this price. Some quantity of anthracene was sold for delivery over the next three months at 1½d. per unit, delivered to buyers' works, casks included.

The average values during the week were: Tar, 16s. to 20s. Pitch, London, 28s.; east coast, 26s. 6d. to 27s.; west coast, 26s. to 27s. Benzol, 90 per cent., 11¾d. to 1s. 0½d.; 50-90 per cent., 11½d. to 1s. Toluol, 1s. 1½d. to 1s. 2½d. Crude naphtha, 4¾d. to 5½d.; solvent naphtha, 1s. 3d. to 1s. 4½d.; heavy naphtha, 1s. 3d. to 1s. 5d. Creosote, London, 2⅝d. to 2⅞d.; North, 1⅝d. to 2d. Heavy oils, 2½d. Carbolic acid, 60 per cent., 1s. 9d. to 1s. 9½d. Naphthalene, £4 10s. to £9; salts, 31s. 6d. to 35s. Anthracene, "A" quality, 1½d. to 1⅝d.

Sulphate of Ammonia.

The market for this article has been rather quiet during the past week, and prices have receded somewhat. The principal London Companies maintain their quotations at £12 10s. to £12 11s. 3d.; but other makes have been offered on Beckton terms at £12 5s. In Hull, business has been done at £12 2s. 6d. for small quantities; while the best makes have not realized more than £12 5s. In Leith, there is practically no business doing, and the price is nominally £12 6s. 3d. to £12 7s. 6d. In Liverpool, business is reported to have been done for prompt delivery at £12 3s. 9d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Reports as to the healthy condition of the coal trade are heard on all sides; and the output is increasing in every department. House coal, at the recent advance, finds plenty of customers; and steam coal can scarcely be supplied in sufficient quantities to meet the full demand. More coal is going down to ships in the Canal for bunkers; and an advance of 6d. per ton is being secured. The same advance is also being obtained by some colliery owners for best slack and burgy on renewed contracts. More inquiries are being made by gas-works managers with regard to their requirements for 1907. Last week's quotations fairly represent current prices at the pit mouth.

Northern Coal Trade.

There is a steadier demand in the coal trade; but there is no pressure in the inquiry for steam coal, though the collieries are well employed for this season of the year. Best Northumbrian steams are steady at from 11s. to 11s. 3d. per ton f.o.b., second-class steams are 10s., and steam smalls are rather scarce and firm at from 7s. to 8s. In the gas coal trade, the demand is now very full, especially for shipment on the long contracts. Exports of gas coals are fair, but not so keen as the home requirements. Durham gas coals vary from about 10s. to 11s. 3d. per ton f.o.b. For one or two of the very best kinds, however, the strong demand causes the price asked to be considerably higher than that stated; and for these classes, the supply does not seem to be in any way in excess of the request. One or two small contracts for gas coals are in the market; and where the delivery is well forward, the full prices mentioned above, according to quality, are asked. The gas coal collieries are now working well; and, with a fair supply of tonnage, contract requirements are kept up to. Coke is very firm; and gas coke maintains its price, despite the increase in the output. Good gas coke for export is quoted up to 14s. per ton f.o.b.; but some of the inland producers are increasing their stocks.

Scotch Coal Trade.

Trade is still very active, with prices fully maintained, and likely to be. Outputs are being taken up readily. The prices quoted are: Ell 9s. 9d. to 11s. per ton, splint 10s. 6d. to 11s., and steam 9s. 6d. to 9s. 9d. The shipments for the week amounted to 291,503 tons—an increase of 8218 tons upon the preceding week, and of 35,936 tons upon the same week of last year. For the year to date, the total shipments have been 12,309,920 tons—an increase of 1,332,037 tons upon the corresponding period of 1905.

In the "JOURNAL" some months ago, we noticed the issue by Mr. F. L. Ramsden, the Engineer and Manager of the Burton-upon-Trent Gas-Works, of an artistic folding card, calling attention to the reduced prices charged by the Corporation for gas to be employed for power and heating purposes, and also to the value of coke as an economical fuel for trade and household use. He is now sending out another, in the form of a book-marker, with the view of further popularizing the use of this material, the prices of which are given at the back of the card.

We have received from the Chicago Pneumatic Tool Company a catalogue devoted exclusively to a detailed description of the air-compressors manufactured at their works at Franklin (Penn.). It is a book of 116 pages, containing illustrations with full detailed descriptive lists of upwards of a hundred sizes and styles of their machines. Constructive principles are described in detail, and information is given relative to several new types of compressors, including Corliss, motor-driven, and gas-engine driven. Much space is devoted to pumping by compressed air, the new Chicago water-lift being described, and practical information is furnished and advice given to all users of compressed air. Tables and formulæ complete the contents of the catalogue.

ALWAYS FIRST

THE

"POSITIVE"

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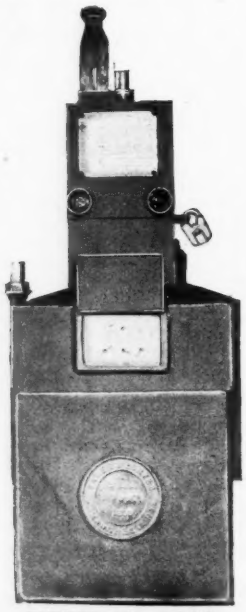

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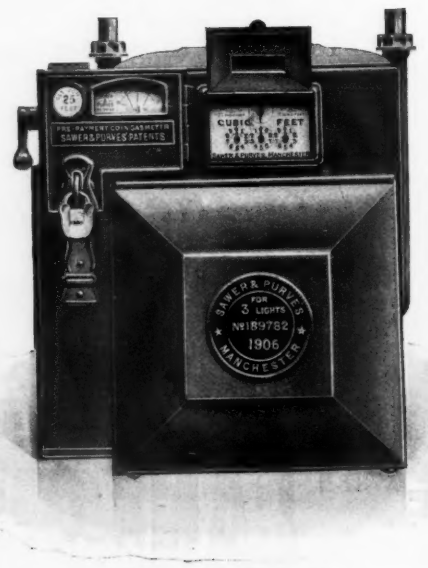

FOREMOST 1906.

SAWER & PURVES,

MANCHESTER & NOTTINGHAM.

What Hull Tradesmen Think of the Electric Light.

The following extract from the "Hull Times" of the 17th inst. sets forth in no uncertain language the opinion of the tradesmen in the town of the electric light: "The improved incandescent light is, it seems, destined to become a very severe competitor of the electric light, especially where the latter illuminant is not regarded as satisfactory. In Hull, we regret to state, several leading tradesmen are reinstalling gas. They complain strongly of the quality of the electric light; and, on the ground that it cannot at all hold its own against a good incandescent light, they are making a change which must prove a loss to the ratepayers' undertaking. The effect on the local electric undertaking (so far as lighting purposes are concerned) will in time prove considerable. The leading drapers are very emphatic in their condemnation of electricity as supplied in Hull for lighting purposes, and as they declare that they cannot get satisfaction, some of them—and these a few of the largest—are reverting to gas. If the electric light for lighting purposes cannot compete with the incandescent light, and tradesmen turn out the former, a situation arises of some gravity. We are not overstating the facts. The electric light in Hull is condemned by tradesmen because it is inefficient and inadequate; and if this be so, the ratepayers, whose capital is at stake, should not let the matter rest. It is a fact that tradesmen think so badly of the electric light that they are discontinuing it; and we should like to know, without procrastination, and in plain terms, what view the Electric Lighting Committee take, and whether they are satisfied with the quality of the light they are producing. If they are satisfied, will they be content to lose good customers who are dissatisfied? And if they think the quality of the light does not meet local requirements, what steps do they propose to take to arrest loss of revenue and provide a remedy?"

Ironmongers and the Sale of Stoves at Southport.

In opening an exhibition of gas appliances organized by the Southport Ironmongers' Association, Alderman Travis, the Chairman of the Corporation Gas Committee, said that the display was one that his Committee took a keen interest in. They had shown practical interest in it by agreeing that gas-fires, which might be purchased from any of the ironmongers, should be fixed free to the consumers on the latter paying the list price for the stoves. Several years ago, the Gas Committee undertook to let out gas-cookers on hire, and also on the hire-purchase system; and from that day ironmongers found their trade in cookers was practically gone. Some of them might be in favour of municipal trading. It was all right where they were bound to have a monopoly, so that the fruits of the monopoly went to the ratepayers. But where they could have ordinary competition between one trader and another, and where they could purchase goods in any shop, and there was no need to pull up the streets, they could leave it with the private trader. When the Gas Engineer asked that they should push forward the sale of gas, by getting out more gas-fires, they had a meeting between themselves to see if they could not do something whereby the traders could keep their trade, and the Gas Committee could get what they wanted—more gas sold. These stoves were ordinarily sold by the shopkeeper at the list price, less 10 per cent.; and they had found in practice, and from inquiries made at their own show-rooms in Lord Street, that people had wished to know the cost of the stoves after they were fixed, and because there was an uncertainty, they had gone away without placing an order. Therefore the Committee had arranged with the ironmongers that if they would give the 10 per cent., the Committee would undertake to pay for the fixing of the gas-fires. They were not reducing the price of gas, because they were meeting the wants of the customers by lowering the cost of installing the gas-fires. They thought it would be an advantage to the Committee, because, instead of having only one show-room, they would have a great many all over the town.

Incandescent Gas Lighting in Germany.

The report of the German Incandescent Gas-Light Company (Deutsche Gasglühlicht Gesellschaft) of Berlin sets forth that the working results in the year ended the 30th of June last were satisfactory, and the turnover in all departments increased. In the mantle branch, the trade suffered from an unfavourable period, though it was possible for the Company and the Associated Companies to find compensation in a considerable extension of the sales. The unfavourable period was brought about by the sudden fall in the price of nitrate of thorium; but the Company were only affected in this respect by the reduction in the quotations for mantles, seeing that they own all the shares in the Germania Chemical Factory, which only produces nitrate of thorium for the consumption of the mantle factories associated with the German Incandescent Gas-Light Company. In consequence of the events in the thorium market, the position of the manufacture of mantles continues uncertain. The report goes on to point out that yarn—the raw material employed for the production of crude mantles—has increased largely in price in recent years, owing to the growth in the demand; and as the Company's consumption is always advancing, the question of establishing a yarn factory is in contemplation. The financial position of the Company in the past three years may be summarized as follows:—

	1905-6.	1904-5.	1903-4.
Share capital	£195,000	£157,500	£120,000
Gross profits	149,900	124,817	95,395
Depreciation allowance	6,737	6,002	3,675
Net profits	52,020	36,678	16,964
Dividend, per cent.	22	20	12

The dividend paid in 1902-3 was at the rate of 9 per cent., and in 1901-2 7 per cent., on a share capital of £120,000; but in 1900-1 the rate was 28 per cent., and it was even higher previously. It will therefore be seen that the Company are now gradually working up to the former days of high dividends, though the share capital has been largely increased in recent years. The reserve fund stands at about 50 per cent. of the share capital; the premium on the last issue of shares having allowed of a large addition being made to the fund.

RADIATOR PICTURES, No. 6.

London College of Music,

in which

Wright's "St. Andrew" Gas-Heated Steam Radiators

are installed.

FOUNDED 1887.

LONDON COLLEGE OF MUSIC.

GREAT MARLBOROUGH ST., LONDON, W.

9th November, 1906.

Messrs. John Wright & Co.,

Dear Sirs,

I have much pleasure in stating that the "St. Andrew" Gas-Heated Steam Radiators which you supplied for use in the College Concert Hall, the small Lecture Hall, and a number of the Class Rooms in this Building are acting quite satisfactorily.

They admirably answer their purpose for heating, are clean and easy to manage, and, so far, have given no trouble at all, although in use for nearly 12 months. I can highly recommend them.

I am, dear Sirs, yours faithfully,

(Signed) T. WEEKES HOLMES,

Secretary.

WRIGHTS THE RADIATOR PEOPLE.

Water Storage at Barry.—At a meeting of the Barry Gas and Water Committee last week, a plan was produced of land recently acquired by the Urban District Council near the source of the present water supply; and the Water Engineer (Mr. E. W. Waite) brought forward the question of the necessity for providing increased storage. He suggested that another reservoir to hold 5 million gallons could be constructed at a cost of about £16,000. The matter is to be further considered.

Gas Consumption at Yeovil.—Since the 1st of January last, 140 additional coin meters and 140 new cookers have been fixed at Yeovil; the numbers now in use being: Coin meters, 1093; ordinary meters, 850 (making a total of 1943); and cookers, 1300. The coin meters are 56·25 per cent., and the ordinary meters 43·75 per cent., of the total number of meters in use; but, in proportion to the gas supplied to them, the coin meters take 23·2 per cent., and the ordinary meters 76·8 per cent., of the whole.

Assessment of the Dowlais Gas-Works.—Messrs. Body and Sons, who were instructed by the Merthyr Assessment Committee to prepare a valuation of the Dowlais Gas-Works, have written stating that the Gas Company refused to allow them to inspect their books, and also to answer the whole of the questions asked. However, they made the valuation on the facts as they ascertained them, fixing the gross value at £1980, and the ratable value at £1300. Messrs. Body suggest that, on receiving these figures, the Company may see the advisability of supplying further facts. The new valuation means an increase of £400.

New Issues of Gas and Water Capital.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards placed, by order of Directors, two new issues of ordinary capital. The first was £20,000 of "B" stock of the Southend Gas Company, ranking for a dividend of 5 per cent., but carrying £5 7s. 6d. per cent. as from the 1st of January next; and, with the exception of one lot, which a purchaser secured for £107 5s., it was all sold at from £107 10s. to £108 10s. per £100—the average being within a trifle of £108. The second issue was 500 £10 shares in the Great Yarmouth Water Company (last dividend 4 per cent. per annum); and they were all sold at par.

Incandescent and Flat-Flame Burners at Rochdale.—A member of the Rochdale Gas Committee having drawn attention to the complaints of cotton operatives of "poor gas," and asked whether this was due to the mixture of coal and water gas, the Manager (Mr. T. B. Ball) replied that the quality was fully up to the usual average. He said he thought the complaint arose from the fact that so many operatives had incandescent light in their own homes, and that therefore they saw the great difference when they worked where flat-flame burners were used. He agreed with a suggestion of another member of the Committee that if incandescent mantles were in general use, the present 18-candle power in Rochdale could be reduced to 14 candles.

More Water for Evesham.—At a meeting of the Evesham District Council last week, the Evesham Villages Joint Water Committee reported as to inquiries made with the view of augmenting the water supply, which had been insufficient during the past two summers. They said Messrs. Willcox and Raikes had reported as to available springs; and the Trustees of Mr. Adams had granted a lease of springs on the Buckland Estate for a term of thirty years at an annual rent of £35. Messrs. T. Vale and Sons, of Stourport, had been engaged to carry out the work of connecting the springs, and laying the main to join the existing pipe; and this would be completed in a few days. The estimated cost of the work was about £1400, which would have to be apportioned among the ten parishes concerned. The Committee recommended the Council to apply for a loan.

Portsmouth Water Company.—At the half-yearly meeting of the Company last Thursday, the Chairman (Mr. W. Grant, J.P.), in moving the adoption of the report already noticed (see *ante*, p. 547), commented on the fact that many of the features could not but be satisfactory to the shareholders. The water-rentals had, he said, increased by £1070; and the Directors were able to carry forward from current account the sum of £8681. The recent parliamentary proceedings had cost £9000. Many of the alterations had been made solely at the suggestion of the Local Government Board; and though the proposed sale of the Company's undertaking to the Corporation had proved abortive, the Chairman of the Water Committee had agreed with him that the terms of purchase were perfectly fair. The prospect had caused much anxiety to the Directors and work to the staff; yet he was sure the shareholders did not by any means regret that their prosperous undertaking had been left in their own hands. The only blot upon the Company's excellent supply of water was its occasional cloudiness; but its purity had never been questioned. The motion was seconded by Colonel L. Owen, and carried unanimously. At a subsequent extraordinary generel meeting, the Directors were authorized to raise additional capital not exceeding £99,000.

Gas Testing in Wandsworth.—At the meeting of the Wandsworth Borough Council last Wednesday, the General Purposes Committee reported having considered a letter from the Gas Examiner, pointing out that on the 20th of October the illuminating power of the gas supplied by the Wandsworth and Putney Gas Company was 13·6 candles and on the 27th 14 candles, which is the Company's standard; and a letter from the Secretary of the Company with reference to the Gas Examiner's report as to the test on the first-named date. The Secretary stated that on the photometer at the testing-place being examined by the makers, it was found that the disc in use had become faded and distorted by continued use; that the effect of this would be to reduce the illuminating power on one side, which agreed with the discrepancy between the Company's tests and those of the Examiner. The Committee had also considered a letter from the Engineer of the Company with reference to the report as to the test on the later date, stating that the Company could not accept it as correct, as their tests at the works during the hours of testing averaged 15·5 candles corrected. A further report had since been received from the Gas Examiner on the subject. Having conferred with the Solicitor, the Committee recommended that no further action be taken with regard to the matter; and this was agreed to.

PARKINSON'S GAS-FIRES.

NEW DESIGNS 1906-7.

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ADJUSTABLE GAS AND AIR REGULATOR.

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PARKINSON AND W. & B. COWAN, LTD.,

Cottage Lane, City Road, LONDON. | Bell Barn Road, BIRMINGHAM.

Reduction in Price at Holyhead.—The Directors of the Holyhead and North Wales Gas and Water Corporation, Limited, have decided to allow, as from Jan. 1, 1907, a discount of 3d. per 1000 cubic feet to ordinary consumers of gas for lighting purposes at Holyhead, providing the account is paid within a month after it becomes due.

Hayling Island in Darkness.—For several nights last week Hayling Island was practically in darkness owing to the failure of the gas supply, in consequence, it is thought, of some of the pipes at the works becoming choked. The first failure was on Tuesday night about seven o'clock; and it naturally caused great inconvenience. On the following evening, more than one local fixture had, for the same reason, to be abandoned.

Price of Gas at Cleckheaton.—A Special Sub-Committee have resolved to recommend the Cleckheaton Urban District Council to reduce the price of gas by 2d. per 1000 cubic feet to all consumers, with an extra 4d. per 1000 feet to large consumers for trade purposes. The matter is to come before the Council at their meeting to-day; but a public meeting has been convened by the Labour party to protest against the reduction to trade consumers, on the ground that it will give them an undue advantage over the rest of the community.

Electric Light Breakdown at Portsmouth.—In consequence of a leakage in the electric light cable supplying the northern part of Portsmouth, several places of worship in the district were considerably inconvenienced on the evening of last Sunday week. Large numbers of candles, however, were requisitioned; and these, with primitive holders in the shape of bottles, enabled the services to be duly conducted. This, of course, refers to those places where there where no gas-fittings. Where these had been retained, no inconvenience was experienced.

Incandescent Gas Lighting in Schools.—At the meeting of the London County Council last Tuesday, the Education Committee reported that applications had been received for improving the gas lighting in the class-rooms and halls of certain schools. In each case a plan had been prepared, showing the best method of arranging the incandescent burners, so as to distribute the light equally over the desks; and in most cases the number of burners and the consumption of gas would, it was stated, be less than at present. They recommended that the lighting of the schools in question should be rearranged; and this was agreed to.

Industrial Gas Exhibition at Newcastle.—The Newcastle and Gateshead Gas Company, in conjunction with Messrs. Fletcher, Russell, and Co., Limited, are holding an exhibition of industrial appliances for use with gas; and practical demonstrations are being given, under the supervision of Mr. A. B. Roxburgh, of the Development Department of the Gas Company. Furnaces are shown in operation, under a heat of 3500°, for annealing, case-hardening, melting metals, heating bars, drills, blanks for stamping, &c., brazing, and other purposes. There are blowpipes of all descriptions; melting pots for lead, stereo metal, &c.; tempering plates; self-heating soldering irons; high-power burners; shoemakers' tool-heaters; glue-pot heaters; tinmen's stoves; a gas-heated steam-boiler, automatic in its action, for warming workshops, &c., by steam; ovens and warming plates, suitable for workmen's dining rooms; and many other methods of applying gas to industrial purposes.

Paignton Water Supply.—The Paignton Urban District Council have adopted a scheme submitted by Mr. F. W. Vanstone for the distribution of water in the district when the new supply becomes available. Three other schemes were sent in, and all were submitted to Mr. Baldwin Latham, the Engineer. Mr. Parnell, the Chairman of the Water Committee, in moving that Mr. Vanstone's scheme be adopted, pointed out that the moorland water which would become available when the new scheme is completed has only 2·5 deg. of hardness as compared with the 5·12 deg. of the present supply, and said that Mr. Vanstone's plan was the only one which adequately provided for mixing the two waters. The emergency arrangements in case of fire were also better than in the other schemes; and there would be an advantage in the provision which was made for extra storage in the new Marldon reservoir, which would save the cost of duplicating the main from Dartmoor for several years.

The Laddite Incandescent Mantle Company, Limited, has been registered with a capital of £35,000, in 34,850 preferred ordinary shares of £1, and 3000 deferred ordinary shares of 1s., to adopt an agreement with J. H. Ladd.

Through the kindness of the Engineer (Mr. E. A. Harman), the members of the Siddal Brotherhood recently paid a visit to the Huddersfield Gas-Works, where they were welcomed by Mr. W. N. Booth, the Deputy-Manager. About two hours were spent in inspecting the works under Mr. Booth's guidance.

The employees of the Newcastle and Gateshead Gas Company have raised for medical charities in the past year £312, which is an increase of £45 on 1905. This amount is to be apportioned as follows: Royal Infirmary, £110; Cathedral Nurse and Loan Society, £7 7s.; Gateshead Nursing Association, £10; Hospital Saturday Fund, £185.

We have received from Messrs. D. Hulett and Co., Limited, their new illustrated catalogue (No. 151) of brackets, pendants, and shade and hall lights for inverted or upright incandescent burners, outside lamps and columns, incandescent "arc" lamps, wrought-iron brackets, &c. The articles illustrated occupy 171 large quarto pages (12 in. by 9½ in.), and they make an excellent show, the book being well got up. The firm have just altered their terms to the trade.

The inhabitants round Thornhill, near Dewsbury, had a trying experience, in consequence of three bursts in the water-mains last Saturday week. In Thornhill proper, the people were fortunately able to secure water from springs in the neighbourhood; but in Thornhill Lees and Savile Town, these facilities were lacking. A water-cart was sent round; but some families had to make use of rain water. One individual fetched from Dewsbury water which he sold at 1d. a jug. The mains were, however, repaired by Sunday evening, and the supply restored.

The "MAIN"

SLOT FIRES.

ELEGANT DESIGNS.

The **"Netley."**

PRICE 24s. 6d. **PRICE 24s. 6d.**

No. 1045.

10 in. fire, 26 in. high.

The **"Norwich."**

PRICE 24s. 6d. **PRICE 24s. 6d.**

No. 1043.

10 in. fire, 26 in. high.

R. & A. MAIN, LTD.,

LONDON, GLASGOW, FALKIRK, &c.

APPLICATIONS FOR LETTERS PATENT.

24,702.—Trier, W. A., "Pressure-gauges." Nov. 5.
24,741.—Lee, R. S., "Incandescent gas-fittings." Nov. 5.
24,779.—Anderson, D., "Inverted burners." Nov. 5.
24,780.—Anderson and Duffield, Ltd., and Pemberton, J., "Anti-vibrating gas devices." Nov. 5.
24,833.—Charlouis, M. D., "Gas generating plant." Nov. 5.
24,864.—Wilson, G., "Fall-down gas crow." Nov. 6.
24,896.—Oxman, H. J., and Luson, T. G., "Gas-fires." Nov. 6.
24,967.—Boston, A., and Field, J., "Shadowless lighting." Nov. 6.
25,031.—Robin, J. I., "Incandescent burners." Nov. 7.
25,045.—Cleveland, F. W., and Browne, H. H. G., "Mantles." Nov. 7.
25,090.—Nichols, A. E., and Brown, A. C., "Bye-pass." Nov. 7.
25,208.—Baumann, P., "Turning gas on and off." Nov. 8.
25,239.—Sanders, G. F., "Draught-proof lamp for incandescent gas-burners." Nov. 9.
25,240.—Sanders, G. F., "Anti-vibrator." Nov. 9.
25,300.—Abraham, A., "Street-lamps." Nov. 9.
25,338.—Bower, A. S., "Increasing the pressure or velocity of aeriform fluids for motive or other purposes." Nov. 10.
25,343.—Keywood, H. G., "Socket-and-spigot pipes." Nov. 10.
25,367.—Bray, J. W., "Lighting and extinguishing gas at predetermined times." Nov. 10.
25,368.—Bray, J. W., "Cowls for chimneys, &c., of incandescent burners." Nov. 10.
25,405.—Meyer, J. H., "Automatically closing gas-passages." Nov. 10.
25,434.—Rider, S. J., "Globe-holders." Nov. 12.
25,469.—Green, H., "Gas-purifiers." Nov. 12.
25,488.—Satch, W. E., "Gas-pendants." Nov. 12.
25,504.—Talbot, H. J., and Fairweather, J. E., "Liquid meters." Nov. 12.
25,516.—Cohn, S., "Inverted mantles." Nov. 12.
25,521.—Cousen, A., "Construction, handling, and use of incandescent burners and mantles." Nov. 12.
25,539.—Hamilton, J. H., "Gas-engines." Nov. 13.
25,547.—Williams, P. E., and Fenner, R. L., "Saturators for the manufacture of sulphate of ammonia." Nov. 13.
25,588.—Cohn, S., "Mantle making." Nov. 13.
25,606.—Export-Gasglühlicht-Gesellschaft m. b. H., "Burner-heads for forming and hardening incandescent mantles." Nov. 13.
25,623.—Bossche, J. J. G. van den, "Gas-engines." Nov. 13.
25,635.—Burtart, H. J., "Liquid meters." Nov. 13.
25,794.—Booth, J., Topping, R., and Simpson, R. J., "Inverted incandescent gas-burners." Nov. 15.
25,813.—Radcliffe, J., "Treatment of spent liquor." Nov. 15.
25,842.—Winn, P., and Wilkes, A. H., "Gas-burners." Nov. 15.
25,873.—Morrison, A. C., "Prepayment meters." Nov. 15.
25,928.—Grossmann, J., "Treatment of ammonia liquors." Nov. 16.
25,943 —Wesche, H. V., "Gas-taps." Nov. 16.
25,976.—Tyers, C. E., Hedley, J., and the United Alkali Company, Ltd., "Treatment of sulphuretted hydrogen, or gases containing sulphuretted hydrogen, for the obtainment of sulphur therefrom." Nov. 16.
26,020.—Shepherd, H. and J., "Mantles." Nov. 17.
26,022.—Spreadbury, W. M., "Gas-stove tap." Nov. 17.
26,032.—Parkinson and W. & B. Cowan, Ltd., and Cheshire, W., "Regulating the supply of gas and air to atmospheric burners." Nov. 17.
26,039.—Glover, S. & T., "Revivifying oxide of iron." Nov. 17.
26,045.—Holman, S., "Retort-lid fastenings." Nov. 17.
26,064.—Winn, P., and Wilkes, A. H., "Gas-burners." Nov. 17.
26,097.—Smith, T., "Indicating, regulating, and adjusting pressures or changes of pressure or supply of gas." Nov. 17.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

Outside Foreman. Portsea Island Gas-Fittings Company.
Analytical Chemist. Cardiff Gas Company. Applications by Dec. 10.
Distributing Foreman. Falkirk Gas Department. Applications by Dec. 8.

Testing Meter Indices. No. 4668.

Plant, &c., for Sale.

Purifiers, &c. Hereford Gas Department.

Plant Wanted on Hire.

Tank Waggons. No. 4679.

Stocks and Shares.

Derby Gas Company. Dec. 12.
Lea Bridge Gas Company. Dec. 11.
Redhill Gas Company. Dec. 4.
West Hampshire Water Company. Dec. 11.

TENDERS FOR

Fire-Clay Goods.

Bradford Gas Department. Tenders by Dec. 13.
Leicester Gas Department. Tenders by Dec. 8.
Manchester Gas Department. Tenders by Dec. 13.

Oxide (New and Spent).

Ramsgate Gas Department. Tenders by Dec. 8.

Pipes, &c.

Leicester Gas Department. Tenders by Dec. 8.

Sulphuric Acid.

Salford Gas Department. Tenders by Dec. 6.

Tar.

Aldershot Gas and Water Company. Tenders by Dec. 13.
Bridgewater Collieries Coke Works. Tenders by Dec. 20.
Shotley Bridge and Consett Gas Company. Tenders by Dec. 11.
Slough Gas Company. Tenders by Dec. 11.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 589.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 12	10½	Alliance & Dublin 10 p.c.	20–21	..	5 0 0
245,112	10	,,	7½	Do. 7 p.c.	14–15	..	5 0 0
200,000	5	Nov. 14	7	Bombay, Ltd.	6¼–7*	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	5–5¼*	..	5 1 10
50,000	10	Aug. 30	14	Bourne- 10 p.c.	28–29	..	4 16 7
51,810	10	,,	7	mouth Gas B 7 p.c.	17–17½	..	4 0 0
53,200	10	,,	6	and Water Pref. 6 p.c.	15–16	..	3 15 0
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	260–265	..	4 14 4
300,000	,,	,,	9½	Do. New	198–203	..	4 13 7
50,000	,,	,,	5	Do. 5 p.c. Pref.	120–125	..	4 0 0
206,250	,,	June 14	4	Do. 4 p.c. Deb.	103–106	..	3 15 6
220,000	Stk.	Sept. 27	11½	Brighton & Hove Orig.	230–235	..	4 15 8
246,320	,,	,,	8½	Do. A. Ord. Stk.	163–168	..	4 18 3
460,000	20	Sept. 27	10	British	41–42	..	4 15 3
104,000	Stk.	Aug. 15	6	Bromley, Ord. 5 p.c.	121–125	..	4 16 0
165,700	,,	,,	4½	Do. do. 3½ p.c.	91–94	..	4 15 9
500,000	10	Oct. 12	7	Buenos Ayres (New) Ltd.	11½–12	..	5 16 8
250,000	Stk.	June 28	4	Do. 4 p.c. Deb.	96–98	..	4 1 8
150,000	20	July 12	8½	Cagliari, Ltd.	24–26	..	6 6 11
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	14–15	..	6 13 4
100,000	10	Oct. 26	4½	Do. 4½ p.c Pref.	9½–10	..	4 10 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	50–52	..	5 15 5
50,000	Stk.	June 28	4½	Do. 4½ p.c. Deb. Stk.	98–100	..	4 10 0
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord.	108½–110½	..	4 10 6
1,443,280	Stk.	Aug. 30	5⅛	Commercial 4 p.c Stk.	110–113	..	4 12 0
560,000	,,	,,	5	Do. 3½ p.c. do.	108–111	..	4 10 1
475,000	,,	June 14	3	Do. 3 p.c. Deb. Stk.	84–86	..	3 9 9
800,000	Stk.	,,	6½	Continental Union, Ltd.	126–129	+1	5 0 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	140–145	..	4 16 7
432,070	Stk.	Aug.	5½	Derby Con. Stk.	122–124	..	4 8 9
55,000	,,	July	4	Do. Deb. Stk.	105–107	..	3 14 9
486,090	10	July 27	11	European, Ltd.	24¾–25¾	+½	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	18–19	..	4 6 10
15,203,110	Stk.	Aug. 15	4⅛	Gas- 4 p.c. Ord.	98½–99½	+½	4 8 5
2,600,000	,,	,,	3½	light 3½ p.c. max.	88–90	..	3 17 9
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	106–109	..	3 13 5
4,193,975	,,	June 14	3	Coke 3 p.c. Con. Deb.	84–86	..	3 9 9
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	98–103	..	4 17 1
82,500	,,	,,	6½	Do. do. 5 p.c.	118–121	..	5 7 5
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	19¼–20⅜	..	5 7 4
4,940,000	Stk.	Nov. 14	8	Imperial Continental	181–183*	–½	4 7 5
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2
181,242	Stk.	Aug. 30	6	Lea Bridge Ord. 5 p.c.	120–125	..	4 16 0
306,083	,,	June 28	4	L'rpool Unit'd Deb. Stk.	110–112	..	3 11 5

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 30	10	Liverpool United A	229–231	..	4 6 7
718,100	,,	,,	7	Do. B	169–170	..	4 2 4
144,140	Stk.	Sept. 13	7⅛	Maidstone 5 p.c.	145–1 0	..	5 1 8
75,000	5	June 28	5	Malta & Medn., Ltd.	4¼–4⅜	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	101–103	..	4 17 1
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 14	3½	Monte Video, Ltd.	11–12*	..	5 16 8
1,675,892	Stk.	Aug. 15	4⅝	Newc'tle & G'tesh'd Con.	111½–112½	..	4 2 3
406,625	Stk.	June 29	3½	Do. 3½ p.c. Deb.	98–100	..	3 10 0
15,000	10	Aug. 30	10	North Middlesex 10 p.c.	20–21	..	4 15 3
55,940	10	,,	7	Do. 7 p.c.	13½–14½	..	4 16 7
300,000	Stk.	May 11	8	Oriental, Ltd.	153–156	..	5 2 7
60,000	5	Sept. 13	7	Ottoman, Ltd.	5⅞–6⅛	..	5 12 0
398,490	5	Oct. 26	7	Primitiva Ord.	7⅞–8	..	4 7 6
796,980	5	July 27	5	Do. 5 p.c. Pref.	5⅞–5⅞	+⅛	4 13 0
488,900	100	June 1	4	Do. 4 p.c. Deb.	96–98	..	4 1 8
851,070	10	Oct. 12	7	River Plate Ord.	12½–12⅝	..	5 7 8
300,000	Stk.	June 28	4	Do. 4 p.c. Deb.	97–59	+1	4 0 10
250,000	10	Sept. 27	8	San Paulo, Ltd.	13½–14	..	5 14 4
70,000	50	July 2	5	Do. 5 p.c. Deb.	49–51	..	4 18 0
135,000	Stk.	Sept. 13	10	Sheffield A	244–246	..	4 1 4
209,984	,,	,,	10	Do. B	244–246	..	4 1 4
523,500	,,	,,	10	Do. C	244–246	..	4 1 4
70,000	10	Oct. 26	10	South African	15⅝–16¼	..	6 1 3
6,350,000	Stk.	Aug. 15	5½	South Met., 4 p.c. Ord.	128–130	+1	4 4 7
1,895,445	,,	July 12	3	Do. 3 p.c. Deb.	84–86	..	3 9 9
201,720	Stk.	Sept. 13	8	South Shields Con. Stk.	156–158	..	5 1 3
575,000	Stk.	Aug. 15	5½	S'th Suburb'n Ord. 5 p.c.	123–126	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref.	123–126	..	3 19 4
112,533	,,	July 12	5	Do. 5 p.c. Deb. Stk.	128–133	..	3 15 2
502,310	Stk.	Nov. 14	5	Southampton Ord.	105–110*	..	4 10 11
120,000	Stk.	Aug. 30	6½	Tottenham A 5 p.c.	127–130	..	5 0 0
388,020	,,	,,	5	and B 3½ p.c.	104–106	..	4 14 4
137,500	,,	June 28	4	Edmonton 4 p.c. Deb.	103–105	..	3 16 2
182,380	10	June 14	8	Tuscan, Ltd.	10⅜–11	..	7 5 6
149,900	10	July 2	5	Do. 5 p.c. Deb. Red.	104–106	..	4 14 4
193,742	Stk.	Sept. 13	5	Tynemouth 5 p.c. max.	106–108	..	4 12 7
30,000	Stk.	Aug. 15	8	Wands- A 5 p.c.	—	..	—
255,636	,,	,,	6⅜	worth B 3½ p.c.	140–145	..	4 9 8
75,000	,,	,,	5⅝	and C 3½ p.c.	113–115	..	4 17 6
79,416	,,	June 28	3	Putney 3 p.c. Deb. Stk	82–85	..	3 10 5
729,875	,,	Aug. 15	5⅛	West Ham 5 p.c. Ord.	104–106	..	4 16 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	120–123	..	4 1 4
193,300	,,	June 28	4	Do. 4 p.c. Deb. Stk.	103–106	..	3 15 6

Prices marked * are "Ex div."